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TECHNOLOGIES

# LINUX | System Administration

## Course Presentation

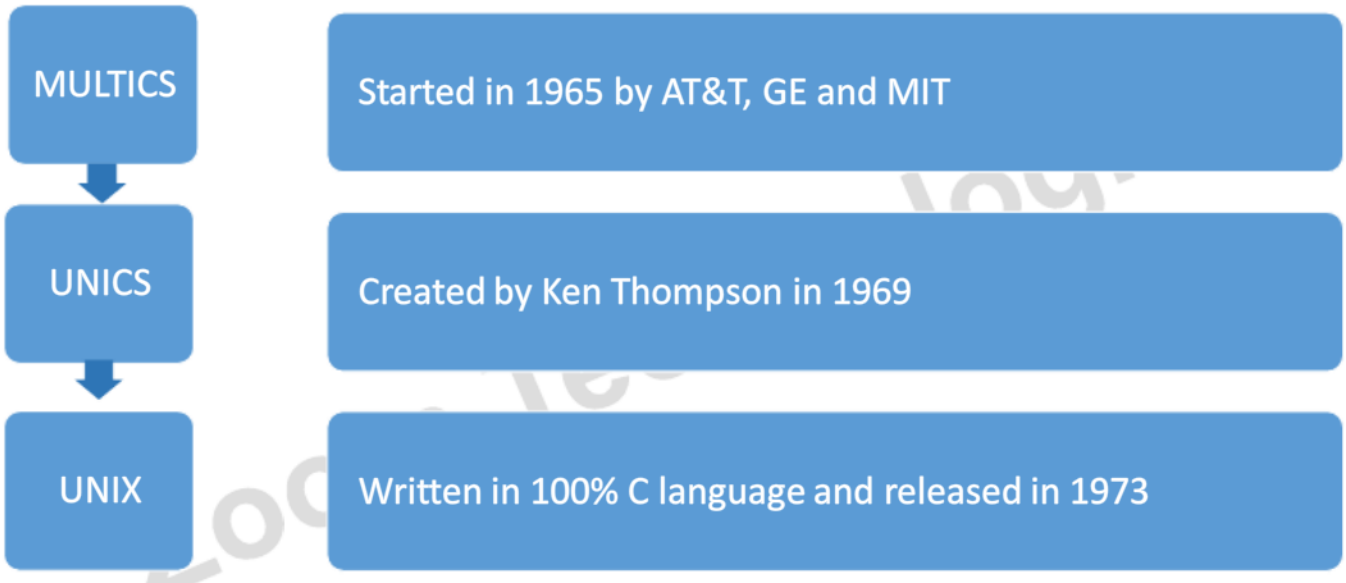
# LINUX
## System Administration

### RHCE Mapped Course

### Course Presentation


Introduction of Linux

## History of Unix






## Operating systems of Unix

| Vendor | Operating System |
|---|---|
| AT&T Bell Labs (American Telephone and Telegraph) | SYSIII – SYS V |
| Sun (Stanford University Network) | Solaris |
| IBM (International Business Machines Corporation) | AIX |
| SG (Silicon Graphics) | IRIX |
| SCO (Santa Cruz Operation) | SCO-UNIX |
| BSD (Berkeley Software Distribution) | Free BSD |
| HP (Hewlett-Packard) | HPUX |

## History of Linux

- In 1990, Linus Torvalds, a graduate student form University of Helsinky designed a UNIX like kernel on 386 Intel machine and gave this to Open Source Foundation(OSF).





## Linux Distributions

redhat

suse

Puppy Linux

Linux Mandrake

ubuntu

debian

backtrack

BOSS Bharat Operating System Solutions

turbolinux

slackware linux

## Red Hat Linux Versions

| Free Editions | Commercial Editions |
|---|---|
| Red Hat 1 to Red Hat 9 | - |
| Fedora core 1 | Red Hat Enterprise Linux<br>RHEL 1 |
| Fedora core 2 | RHEL 2 |
| Fedora core 3 | RHEL 3 |
| Fedora core 4 | |
| Fedora core 5 | RHEL 4 |
| Fedora core 6 | RHEL 5 |
| Fedora 7 | |
| Fedora 8 to Fedora 18 | RHEL 6 |
| Fedora 19 to Fedora 22 | RHEL 7 |



## Features of Linux

- **Open Source**
  - **Free software along with the source code and documentation.**
- **Multitasking**
  - **Capable of running multiple applications and process at the same time.**
- **Multi-user**
  - **Allows multiple users to login and use the resources at the same time.**
- **Portability**
  - **Can be installed on all hardware architecture.**

## Features of Linux

- Scalability
  - Same operating system can be used on a desktop to a super computer.
- Reliability
  - Large servers have been successfully being running without a single second of down time.
- Security
  - Inbuilt firewall (iptables) and SELinux





## Companies are using Linux

## Reference Books

- Unix Concepts and Applications by Sumitabha Das.
- Red Hat Linux Network and Administration by Terry Collings and Kurt Wall.
- Red Hat Fedora Linux Bible by Christopher Negus.



## Hardware Requirement

| | | Minimum |
|---|---|---|
| Processor | | Dual Core |
| RAM | Text | 512 MB |
| | GUI | 1 GB |
| Hard Disk Space | Text | 10 GB |
| | GUI | 15 GB |



## Recommended Partition Size

| Partition | Size |
|---|---|
| /boot | 200 MB |
| / | 8000 MB |
| /usr | 10000 MB |
| /var | 10000 MB |
| /home | 2000 MB |
| swap | Twice the RAM size (Recommended ) |

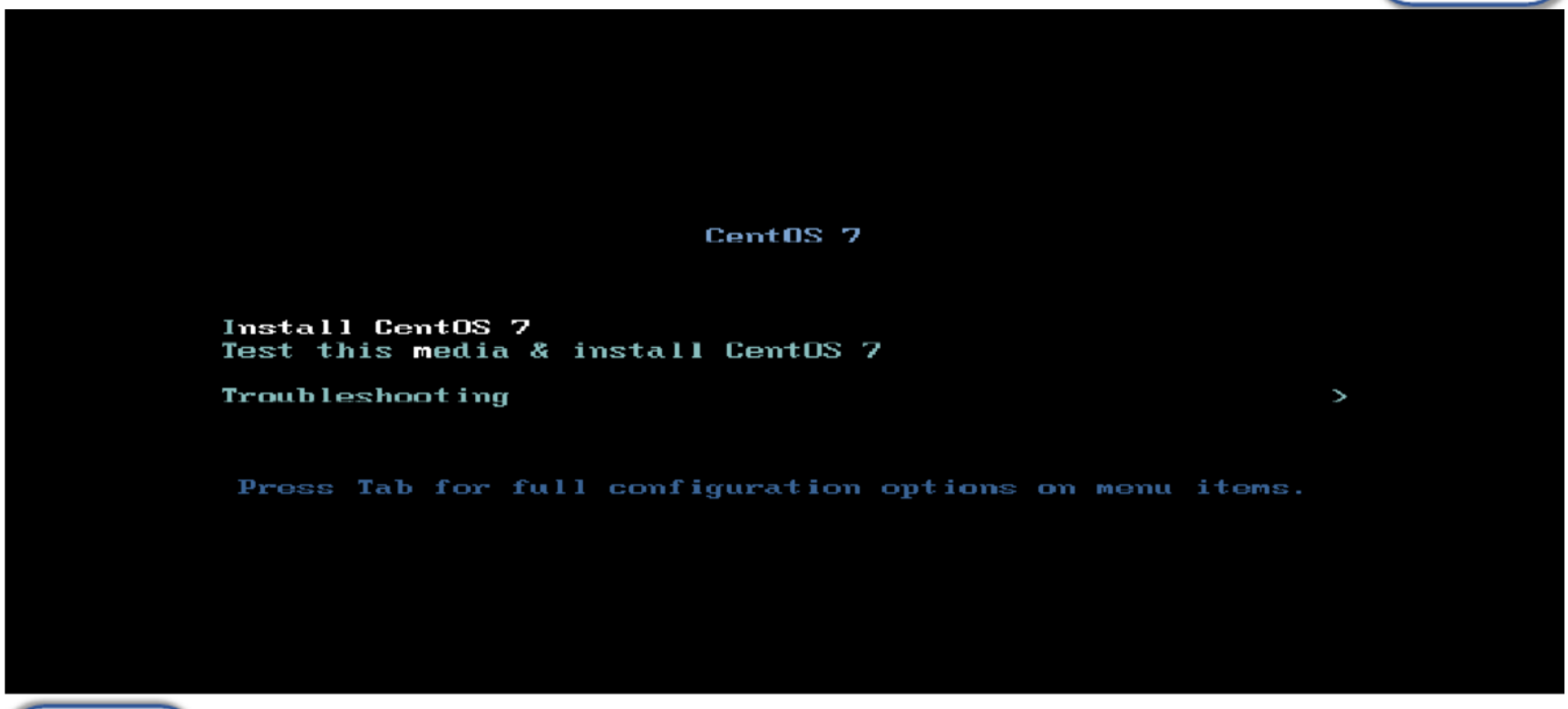
## Installation steps

- Region (Time Zone)
- Languages selection
- Installation source
- Installation destination(Partitioning)
- Keyboard language selection
- Software selection
- Network and Hostname Configuration
- Boot loader configuration





## Installation steps

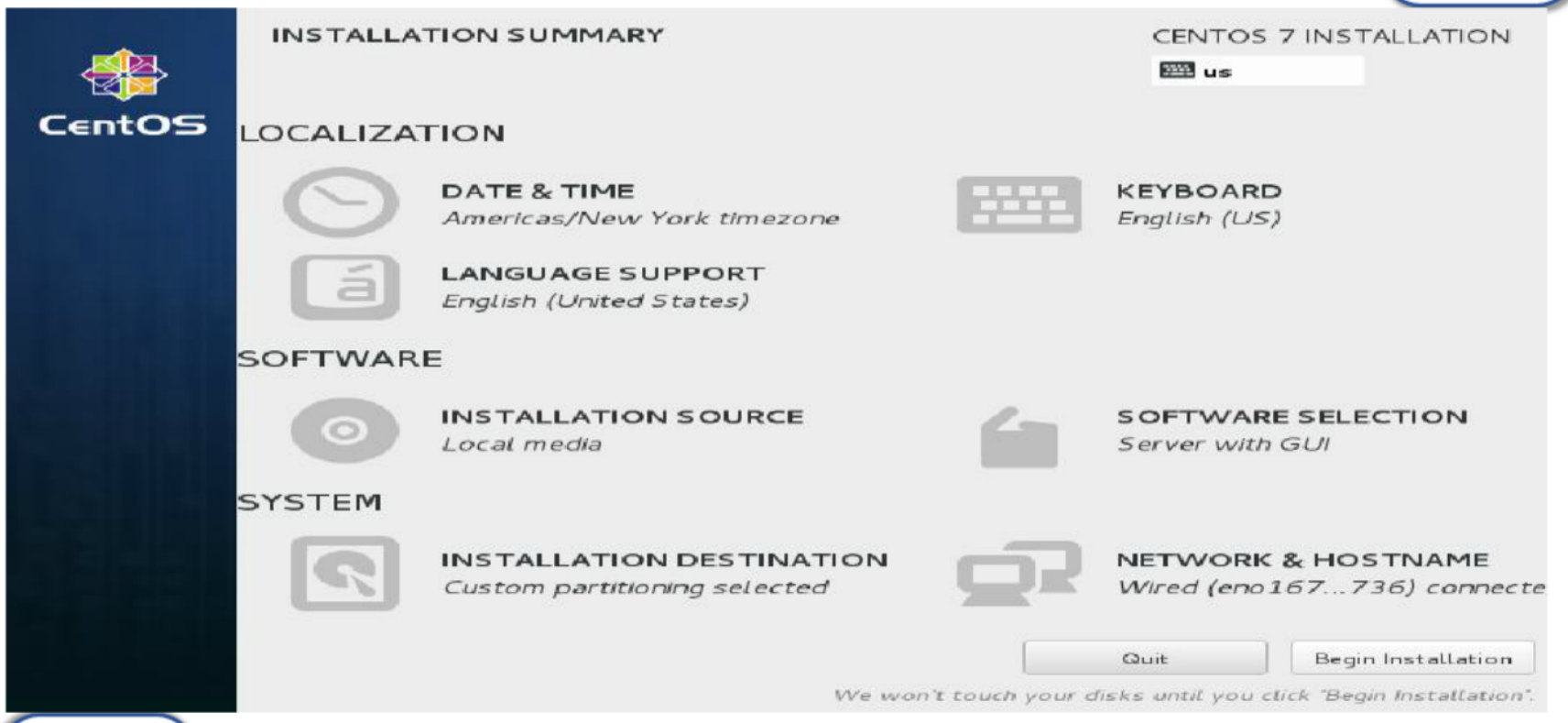


## Installation steps



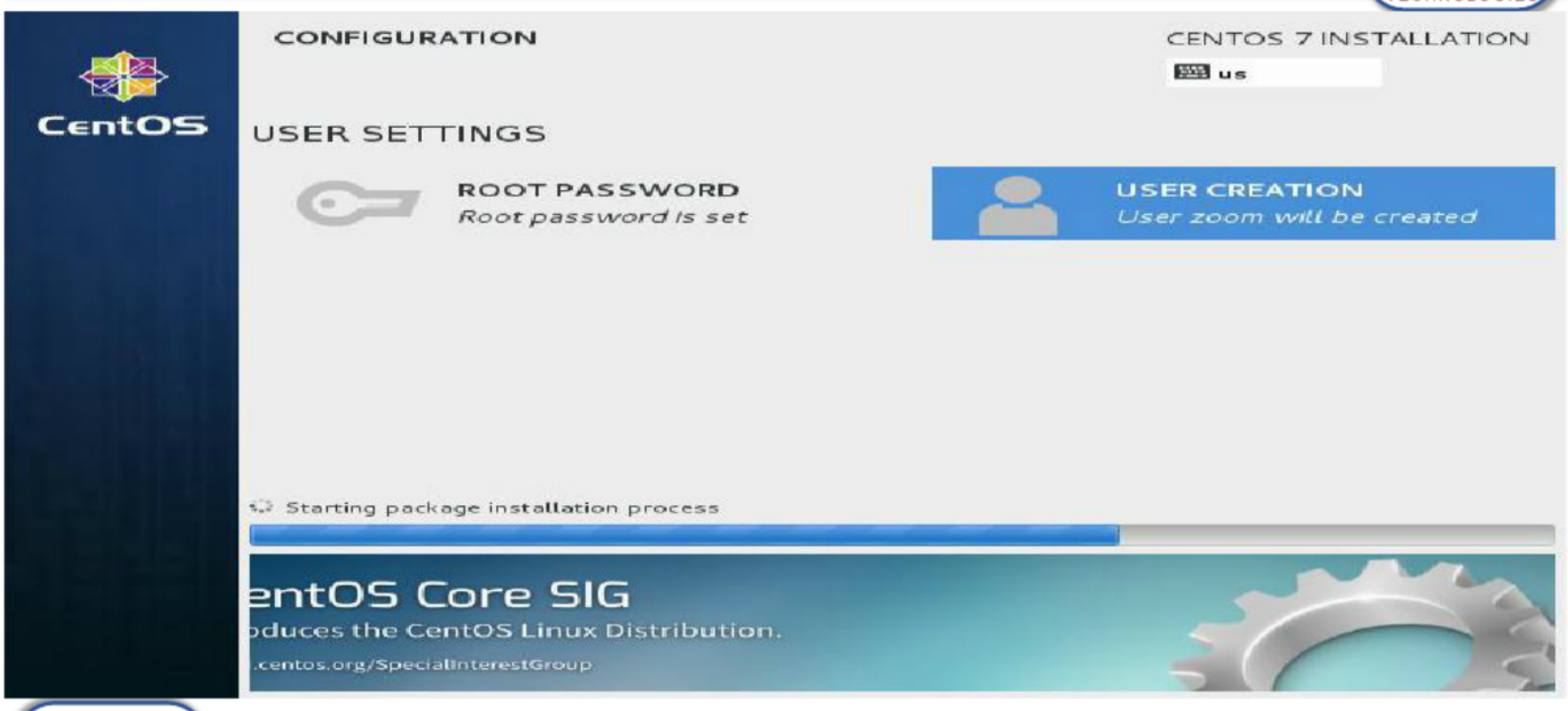

## Installation steps

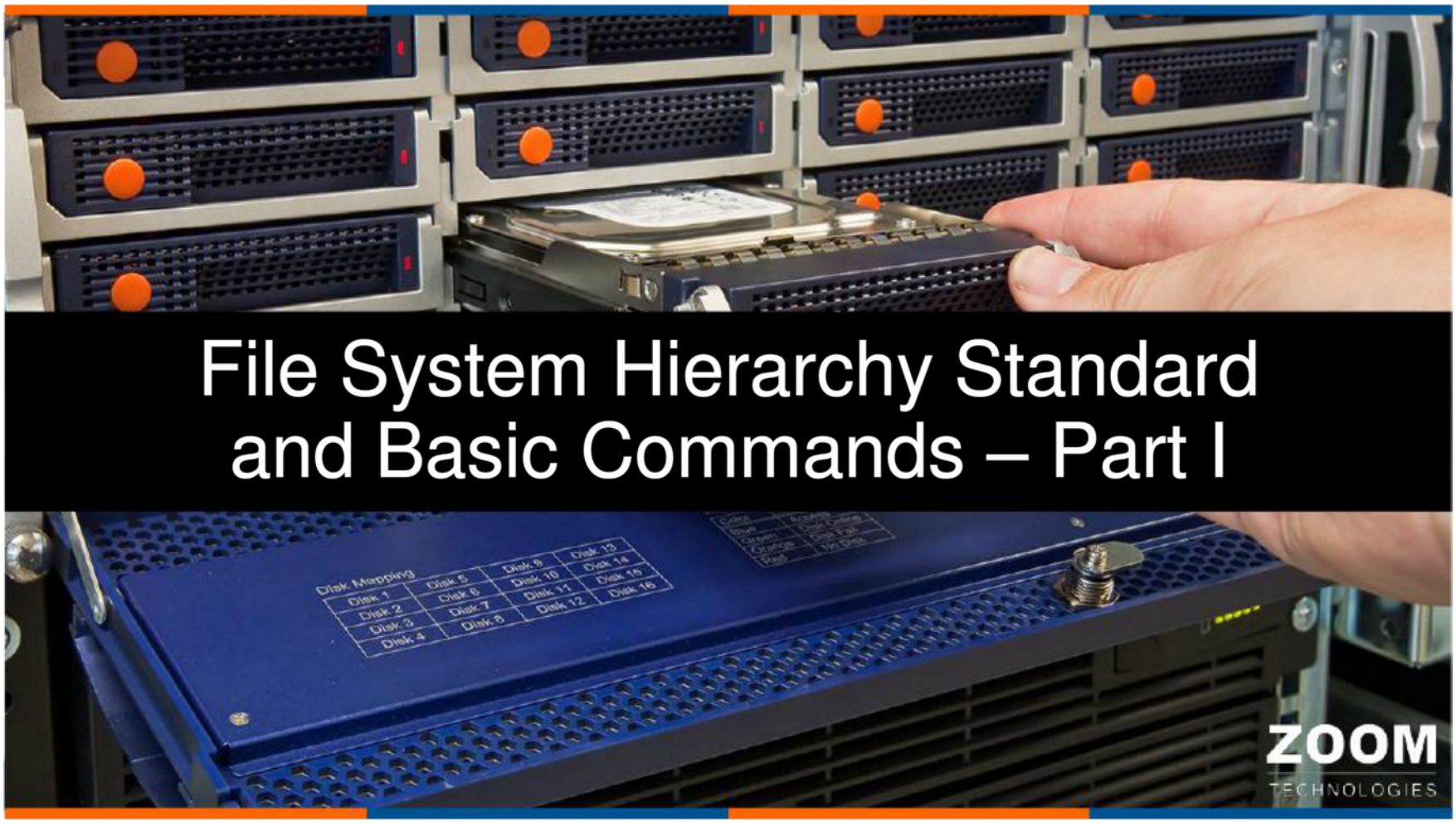
## Installation steps






## Installation steps




File System Hierarchy Standard
and Basic Commands – Part I
Disk Mapping
Disk 1
Disk 2
Disk 3
Disk 4
Disk 5
Disk 6
Disk 7
Disk 8
Disk 9
Disk 10
Disk 11
Disk 12
Disk 13
Disk 14
Disk 15
Disk 16
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File System Hierarchy Standard (FHS)
Disk Mapping
Disk 1
Disk 2
Disk 3
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Disk 5
Disk 6
Disk 7
Disk 8
Disk 9
Disk 10
Disk 11
Disk 12
Disk 13
Disk 14
Disk 15
Disk 16
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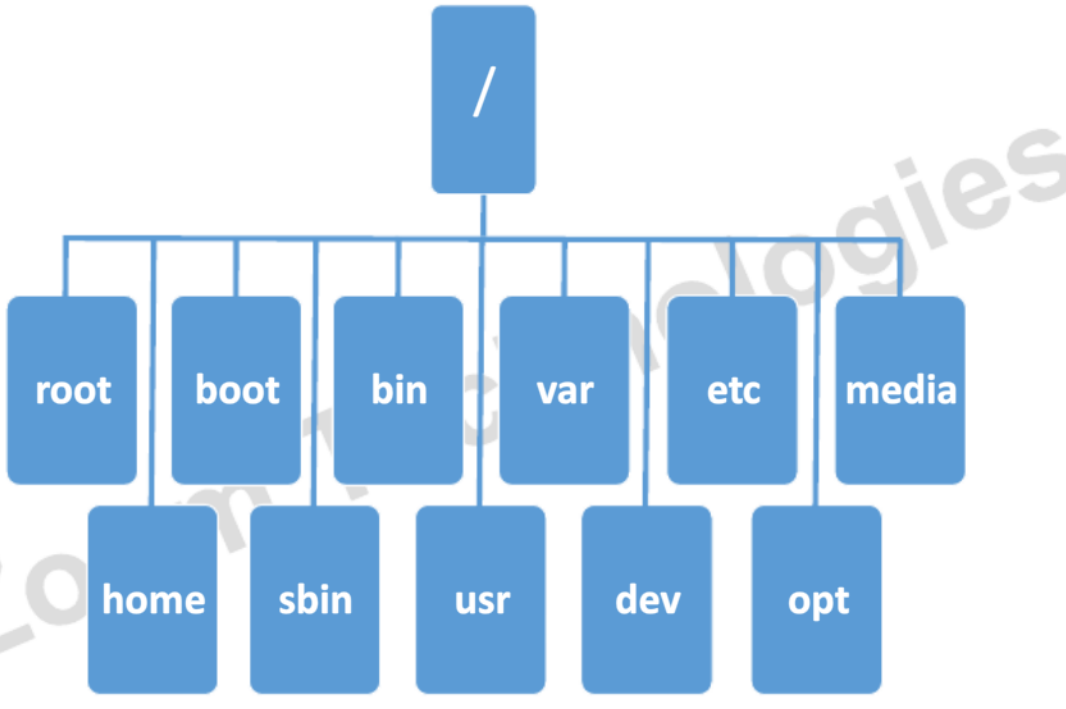
## File System Hierarchy








## /

- This directory is called as the ‘root’ directory.
- It is at the top of the file system structure.
- All other directories are placed under it.

## /root

- This is the default home directory of the root.
  - **Note:** In Linux / Unix the administrator is called as root.





## /home

- It contains the home directories of all users (similar to 'Documents and Setting' folder in Windows).
- When any user logs in the current working directory by default is the users home directory.

## /boot

- It contains the kernel, which is the core of the operating system.
- It also contains the files related for booting the OS such as the boot loader.





## /sbin

- sbin stands for system binary.
- It contains essential system commands which can only be used by the superuser (root).
- Example:- fdisk, dump, etc.

## /bin

- bin stands for binary
- It contains essential commands which are used by all users.
- Example:- ping, cat, chmod, etc.





## /usr

- usr stands for Unix system resources
- It contains the programs and applications which are available for users (similar to program files in Windows).

## /var

- var stands for variable
- It contains variable information, such as logs and print queues.





## /dev

- dev stands for device
- It contains information about all hardware devices.

## /etc

- etc stands for et cetera
- Contains all the configuration files.





## /opt

- opt stands for optional
- It generally contains the third party software's.

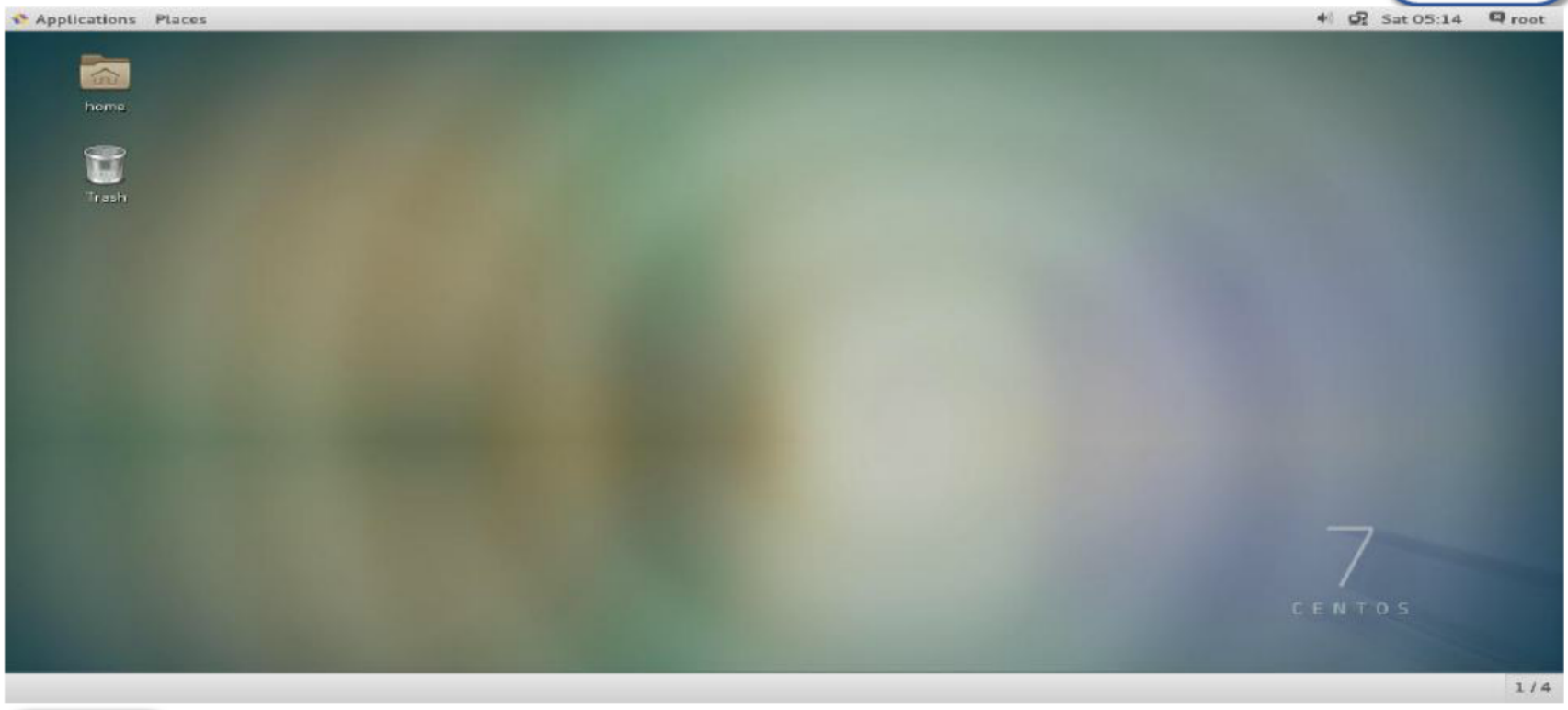
  Example:- Open Office, Kaspersky Antivirus etc.

## /media

- It is the default mount point for removable storage media such as cdrom/dvd and pendrives, etc.



## Desktop




# Basic Commands Part - I

## Print Working Directory

Print the name of the current working directory

[root@comp1 ~]# **pwd**

To find partitions and size

[root@comp1 ~]# **gnome-system-monitor**



## List of Files and Directories

To see the list of files and directories

[root@comp1 ~]# **ls <options> <arguments>**

**Options**

**-l** **Long list including attributes**

**-a** **All files and directories including hidden**

**-d** **For a particular file or directory**

**-R** **Recursive to see the tree structure**

**- i** **Inodes list**

## Creation of Files

Files can be created by using any of the three commands given below:

- cat command
- touch command
- vi editor





## Cat (Concatenation) Command

Creating and displaying text files

[root@comp1 ~]# **cat <options> <arguments> <filename>**

To create a file

[root@comp1 ~]# **cat > <filename>**

To view the contents of a file

[root@comp1 ~]# **cat <filename>**

## Creating a file by using cat command

To append or add to an existing file

[root@comp1 ~]# **cat >> <filename>**

To combine the data of two or more files into a third file

[root@comp1 ~]# **cat <first file> <second file> >> <third file>**



## Creating a file by using touch command

To create a zero byte file

[root@comp1 ~]# **touch** <filename>

To create multiple zero byte files

[root@comp1 ~]# **touch <first file> <second file> <third file>**

To change the time stamp of a file or directory

[root@comp1 ~]# **touch <directory or filename>**

## Creating a file by using vi command

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To create file

[root@comp1 ~]# **vi <filename>**





## Creating Directories

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To create a directory

[root@comp1 ~]# **mkdir <directory name>**

To create multiple directories

[root@comp1 ~]# **mkdir <first dir> <second dir> <third dir>**

To create nested directories

[root@comp1 ~]# **mkdir -p <first dir>/<second dir>/<third dir>**

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## Navigation of Directories

To change the directory

[root@comp1 ~]# **cd <path of the directory>**

To change directory one level back

[root@comp1 ~]# **cd ..**

To change directory two levels back

[root@comp1 ~]# **cd ../..**



## Navigation of Directories

To change to the last working directory

[root@comp1 ~]# **cd –**

To change to the users home directory

[root@comp1 ~]# **cd**



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To view the manual page of a command

[root@comp1 ~]# **man <command>**

To view the commands history

[root@comp1 ~]# **history**

## Copying

To copy a file or directory

[root@comp1 ~]# **cp <options> <source file> <destination>**

**Options**

**-r** **Recursive (To copy the directory along with its contents)**

**-v** **Verbose**

**-p** **Copy with permissions**



## Moving and Renaming

To move a file or directory to a different location

[root@comp1 ~]# **mv <source file or directory> <destination>**

Rename a file or directory

[root@comp1 ~]# **mv <old name> <new name>**

## Deleting

To remove or delete an empty directory

[root@comp1 ~]# **rmdir <directory name>**

To remove or delete a file or directory

[root@comp1 ~]# **rm <options> <file or directory name>**

**Options**

**-r** **Recursive (Directory along with contents)**

**-f** **Forcefully**



## Some Other Commands

To check date and time

[root@comp1 ~]# **date**

To change the date and time

[root@comp1 ~]# **date –s "day month date hours min seconds"**

To see the calendar

[root@comp1 ~]# **cal | less or # cal | more**

## File Viewing Commands

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To view the contents of a file screen-wise

[root@comp1 ~]# **less <filename>**

To view the top lines of a file

[root@comp1 ~]# **head <filename>**

[root@comp1 ~]# **head -5 <filename>**

To view the bottom lines of a file

[root@comp1 ~]# **tail <filename>**

[root@comp1 ~]# **tail -3 <filename>**



## File Viewing Commands

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To find the location of file or directory

[root@comp1 ~]# **find / -iname <file/dir name>**

To count the words, lines and characters of file

[root@comp1 ~]# **wc install.log**


# Vi Editor

## Editors

**Editors are used for adding, modifying and / or deleting text.**

**The different editors used**

- **Windows :notepad**
- **DOS :edit**
- **Linux/Unix**
  - **CLI based :ex , ed , vi and vim, etc.**
  - **GUI based : emacs, gedit, nedit, nano, notepad, kwrite and pico, etc.**

## Editors

- VI editor is a screen-oriented text editor written by Bill Joy in 1976.
- This is the most commonly used editor for editing files in Linux.
- This editor works on basis of default three modes.

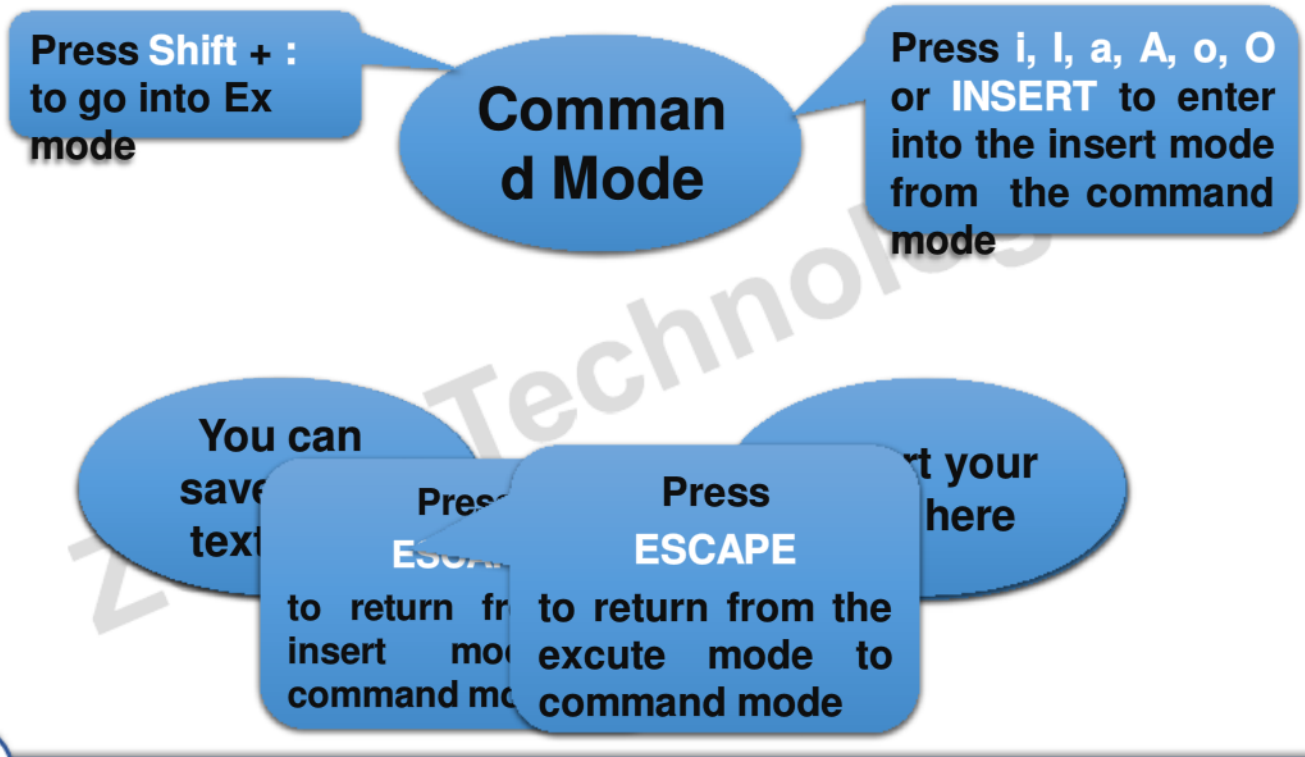




## VI Editor Modes

- Command Mode
- Insert Mode
- Ex Mode (Extended Command Mode)

## VI Editor modes








## To go Insert Mode from Command Mode

- **i** - Inserts the text at the current cursor position
- **I** - Inserts the text in beginning of a line
- **a** - Adds the text after the current cursor position
- **A** - Adds the text at the end of a line
- **o** - Inserts the text one line below current cursor position
- **O** - Inserts the text one line above current cursor position

## Extended mode

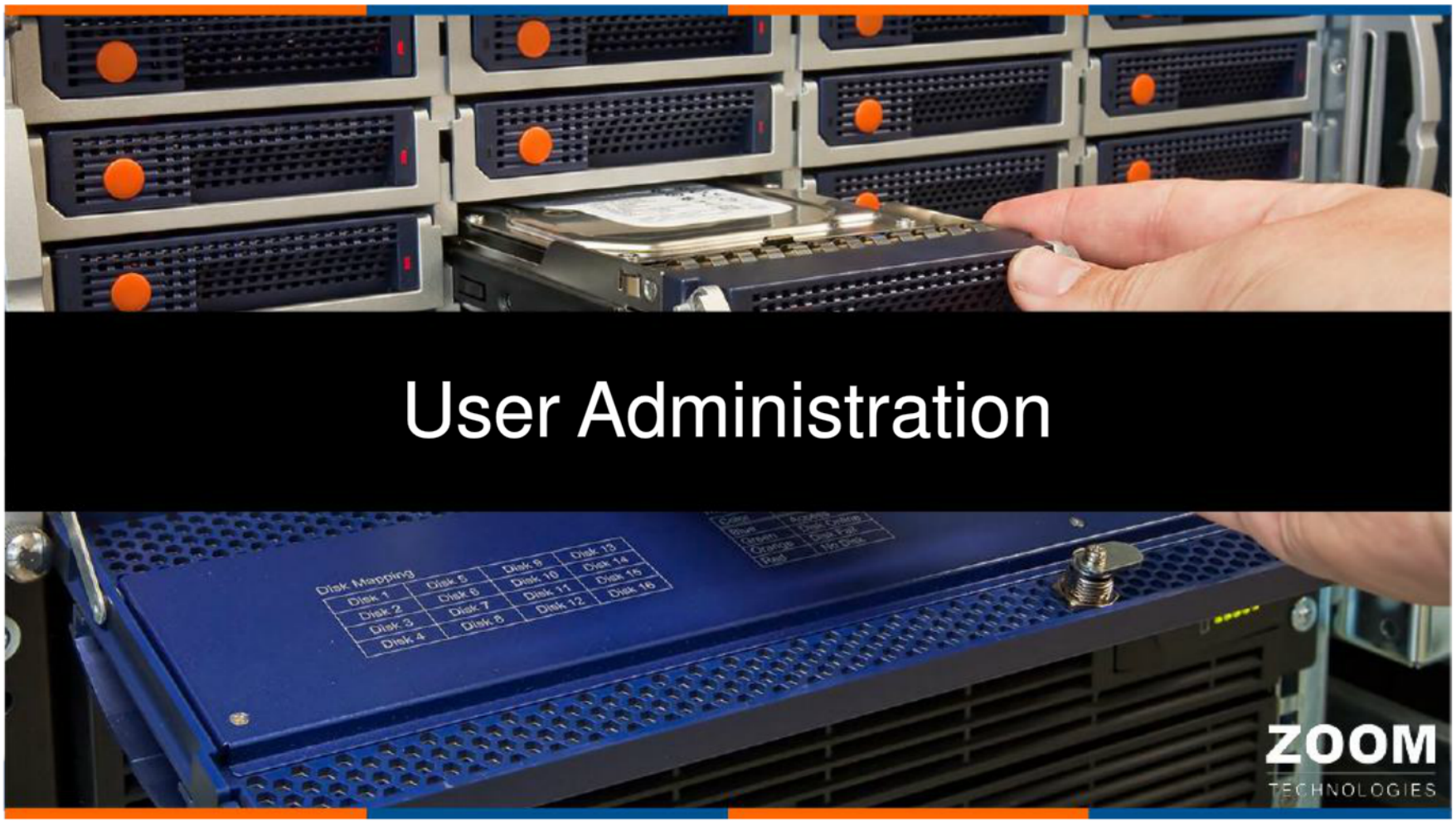
- :q - Quit without saving
- :q! - Quit forcefully without saving
- :w - Write (save)
- :wq - Save and quit
- :wq! - Save and quit forcefully
- :se nu - Sets line numbers
- :se nonu - Removes line numbers
- :84 - The cursor goes to line 84
- 1,$s/old name/new name - Replace the word name





## Command Mode

- dd - Deletes a line
- ndd - Deletes ‘n’ lines
- yy - Copies a line
- nyy - Copies ‘n’ lines
- p - Put (pastes the deleted or copied text)
- u - Undo (you can undo 1000 times)
- Ctrl+r - Redo
- G - Moves the cursor to the last line of the file
- /<word to find> - Finds a word (press n for next)




# User Administration

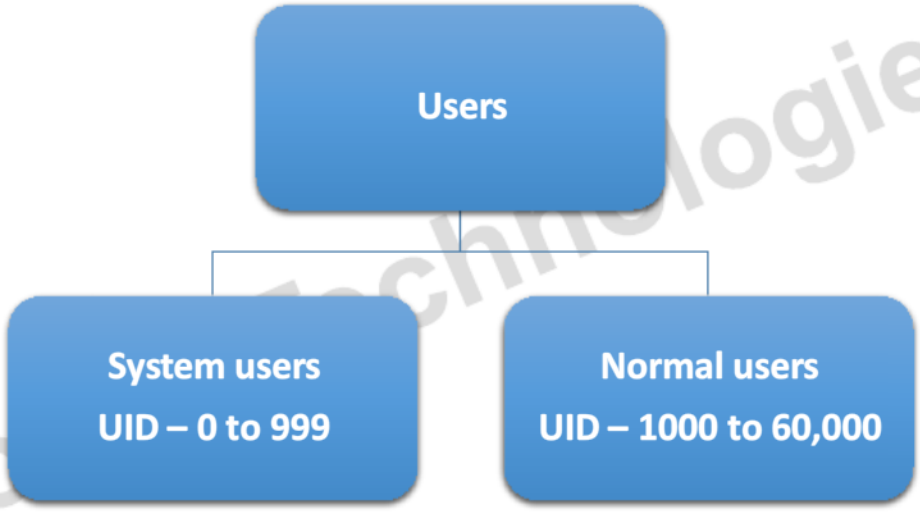
## Users

- In computing, a user is a person who uses a computer's objects, resources or Internet service.

- A user will have a user account that identifies the user by a username. The username can be recognize even with the uid.

- To log on to a system, a user is required to authenticate himself with a password for the purposes of accounting, security, logging, and resource management.

## Types of Users



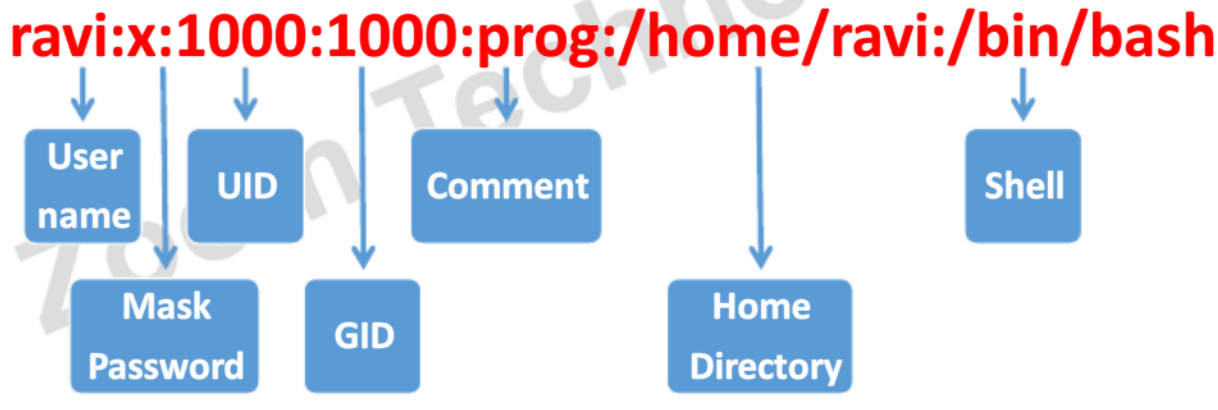





## Users Database Files

- The information regarding the user is stored in the following files:
  - /etc/passwd
  - /etc/shadow

- The information of each user created is stored in a separate line in the file /etc/passwd
- Each record has seven fields separated by a : as given:-






User Properties

- When a user is created in Linux/UNIX, the following are also created by default:
  - User Private Group Scheme
  - Mail account /var/spool/mail/[username]
    Note: Mail accounts can be use if mail server is working
  - Unique user identifier (UID) and group identifier (GID)



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## User Password Properties

- This file contains the encrypted user password
- Passwords are encrypted using SHA 512 default which can even be change /etc/shadow

**ravi:hjkadfhs8974ut/:16682:0:99999:7:::**

- User name
- Encrypted Password
- Number of days since 1970
- Minimum life of the password
- Maximum life of the password
- Warning Days





## Creating a User

Adding a user

[root@comp1 ~]# **useradd <username>**

or

[root@comp1 ~]# **useradd <options> <arguments> <username>**

**Options**

| | | | |
|---|---|---|---|
| -u | UID | -c | Comment |
| -g | Primary group | -d | Home directory |
| -o | Override | -s | Shell |
| -G | Secondary group | | |

## User Properties Viewing Commands

To view the contents of a file screen-wise

[root@comp1 ~]# **less <filename>**

To view the top lines of a file

[root@comp1 ~]# **head <filename>**

[root@comp1 ~]# **head <filename>**

To view the bottom lines of a file

[root@comp1 ~]# **tail <filename>**

[root@comp1 ~]# **tail <filename>**



## Assigning password on user

Creating or changing a user's password

[root@comp1 ~]# **passwd <username>**

To find a user's password encryption tool

[root@comp1 ~]# **passwd -S <username>**

## Modifying User Properties

Modifying user properties

[root@comp1 ~]# **usermod <options> <arguments> <username>**

**Options**

**-l Change the login name** **-U Unlock the account**

**-L Lock the account**

**Note:** All options of 'useradd' command can be used with 'usermod' command



## Deleting a User

Deleting a user

[root@comp1 ~]# **userdel <options> <username>**

**Options**

**-r recursively**

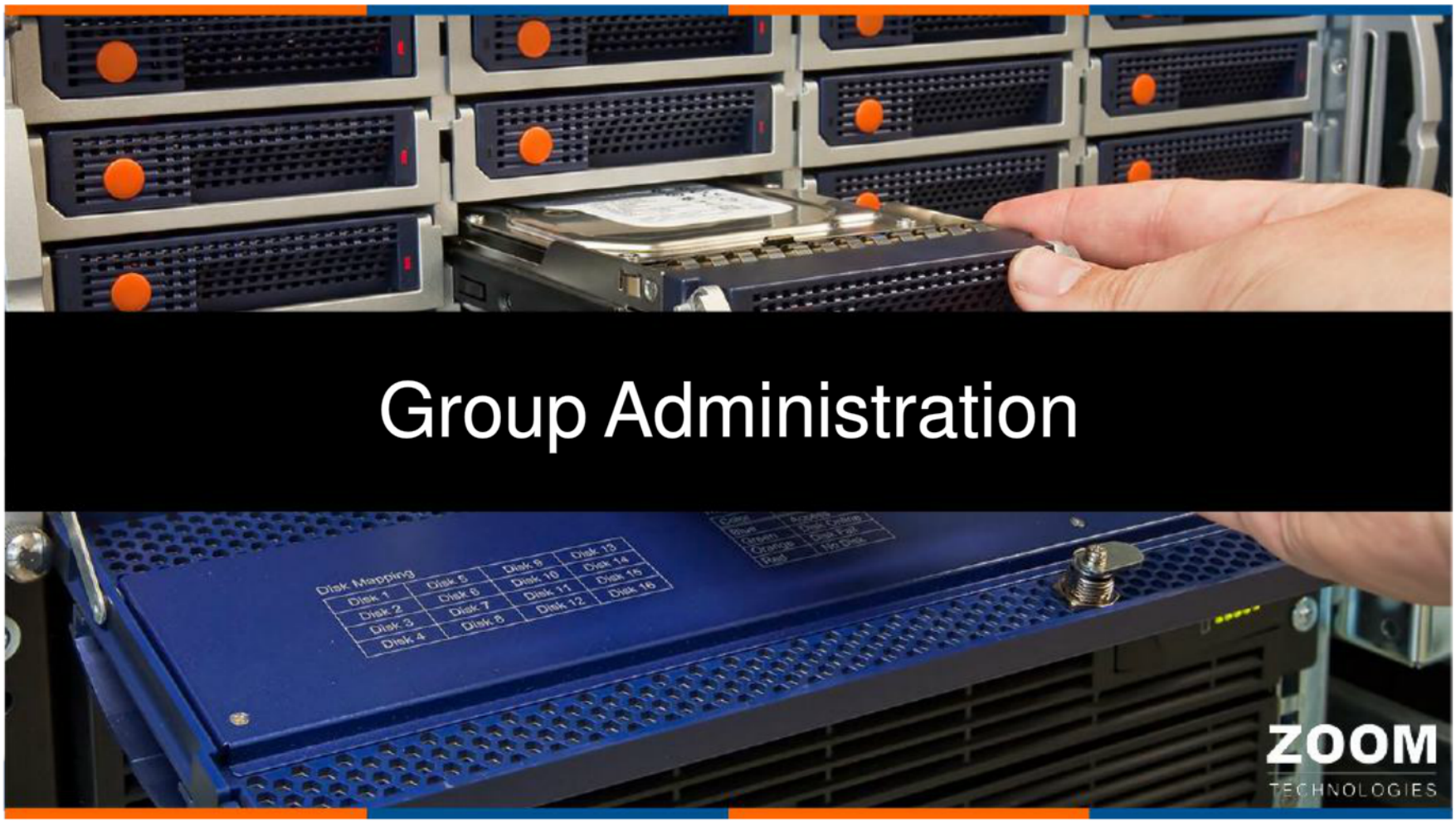
**(deletes the home directory and mailbox also)**

## Adding users on GUI Mode

Adding, Modifying and Deleting a user

[root@comp1 ~]# **system-config-users &**






# Group Administration



- Group is a collection of user to whom the same permissions are to be applied.
- There are two types of groups
  - Primary
  - Secondary

## Groups

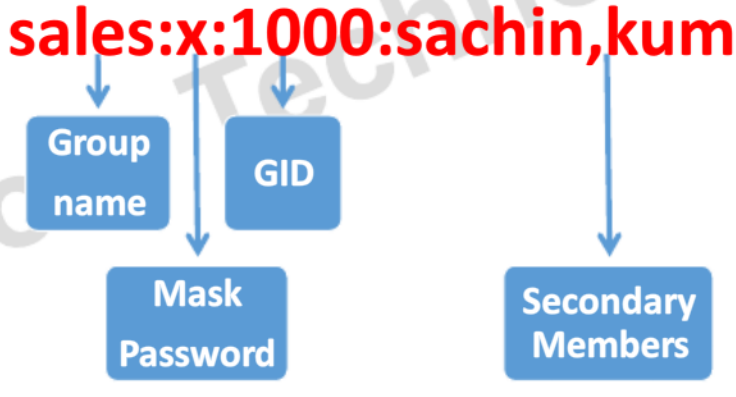
- Linux uses a User Private Group (UPG) Scheme
  - When a user is created a group with the same name as the groupname is also created.
  - This becomes the primary group for that user.
  - A user can have only one primary group.
  - The main use of Primary group is to apply Disk Quotas.
- The group which created manually by root user to add an existing users is called Secondary Group.





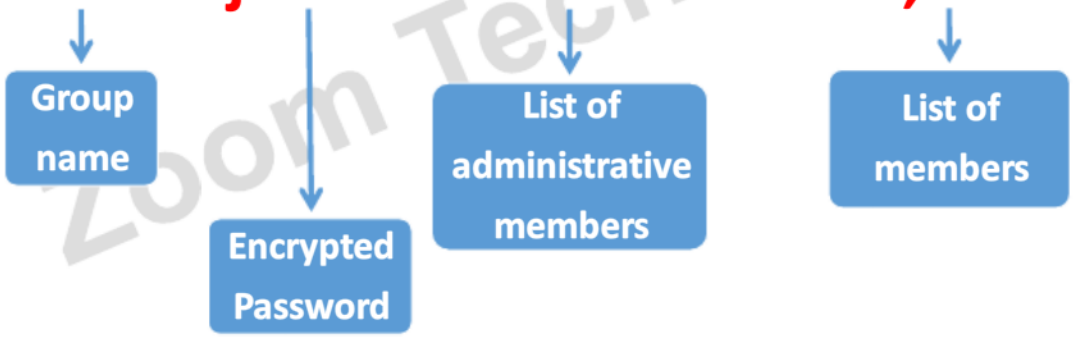
## Group Properties

- The information of each group created is stored in a separate line in the file /etc/group
- Each record has four fields separated by : as given:-



## Group password properties

- This file contains the encrypted group password
- Passwords are encrypted using MD5 (Message Digest Version 5) Algorithm /etc/gshadow








## Creating a Group

Creating a group

[root@comp1 ~]# **groupadd <groupname>**

or

[root@comp1 ~]# **groupadd <options> <arguments> <groupname>**

**Options**

**-g** **GID**

**-o** **Override**

## Modifying a Group

Modifying a group

[root@comp1 ~]# **groupmod <option> <arguments> <groupname>**

**Options**

**-g** **GID**

**-o** **Override**

**-n** **Group name**





## Deleting a Group

Deleting a group

[root@comp1 ~]# **groupdel <group name>**

**Note: A group cannot be deleted if it has primary members.**

## Group Membership

Group membership

[root@comp1 ~]# **gpasswd <option> <arguments> <grpname>**

**Options**

**-M** **Add multiple users to the group**

**-A** **Adds a group administrator**

**-a** **Add a user to the group**

**-d** **Delete a user from the group**



## Managing Groups Using (GUI)

Managing groups using (gui)

[root@comp1 ~]# **system-config-users &**


# Basic File Permissions

## Permissions

- In computing, a permissions are use to create secure environment in the network to secure the data an against from unauthorized users.

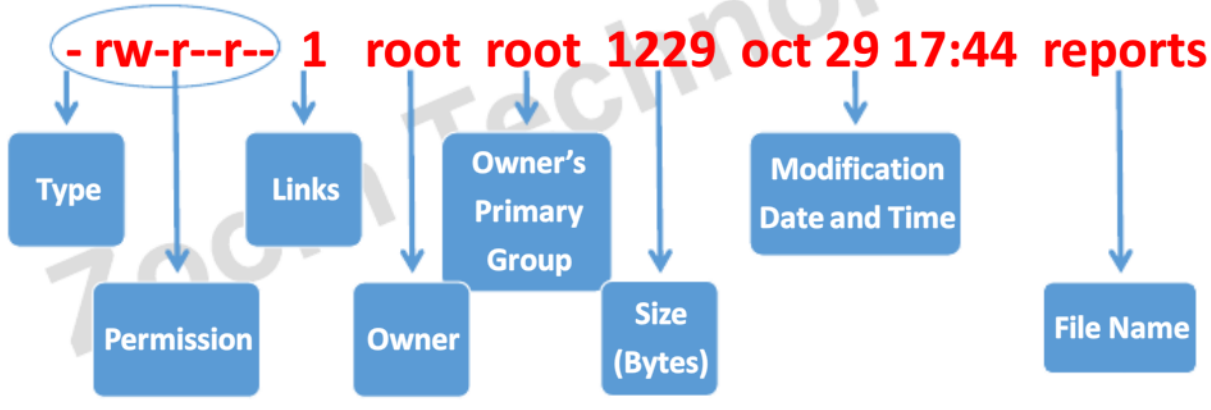
- In Linux Platforms permissions are secured by the default mechanism called Umask.

- Permissions are mainly use in sharing data environment which can be implement in Linux by using some servers like Nfs and Samba.

## File and Directory Attributes

- Unix/Linux files have 8 attributes that can be seen with ls –ld command

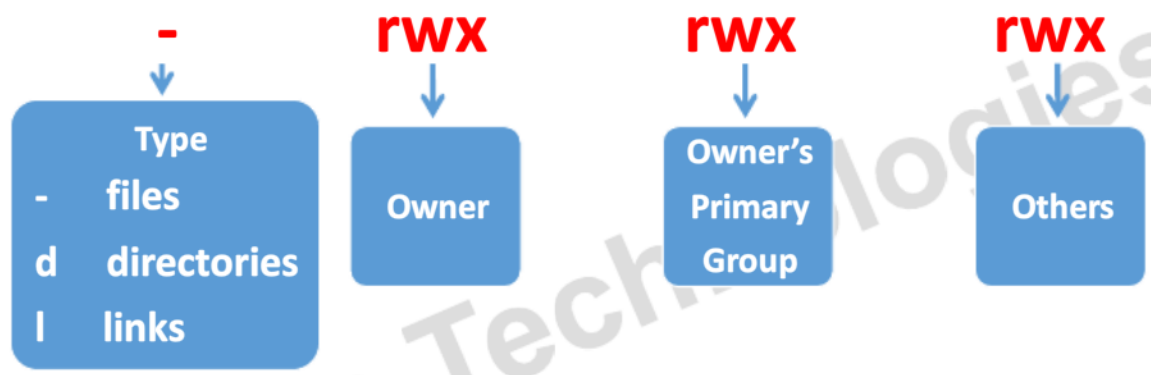
```
[root@comp1 ~]# ls -ld reports
```



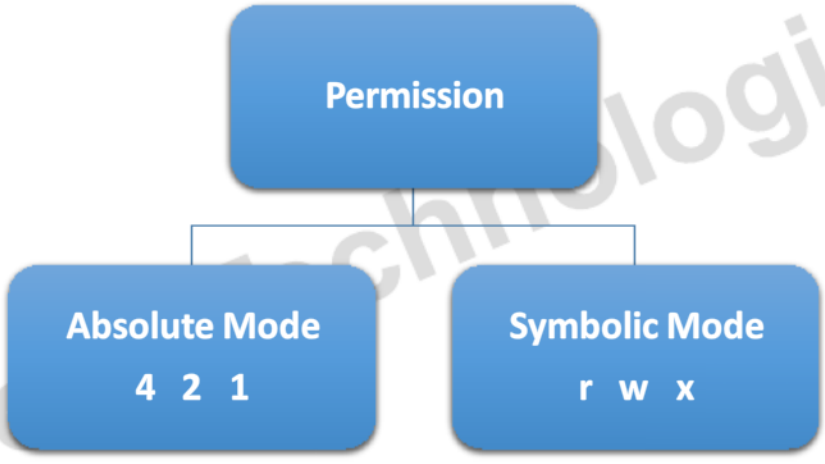

**Note:** Only the owner or the root can change the permissions



## Access Levels



## Access Modes








## Access Modes

| Access Mode | | File | Directory |
|---|---|---|---|
| r | 4 | To displays the contents of the file | To list the contents of the directory |
| w | 2 | To modify or append to the file | To create or remove file and directories |
| x | 1 | To execute the file | To enter into the directory |

## Default Permissions

| | File | | Directory | |
|---|---|---|---|---|
| Created by Root | rw_r_ _r_ _ | 644 | rwxr_xr_x | 755 |
| Created by User | rw_rw_r_ _ | 664 | rwxrwxr_x | 775 |





## Modifying the Permissions

Modifying the permissions

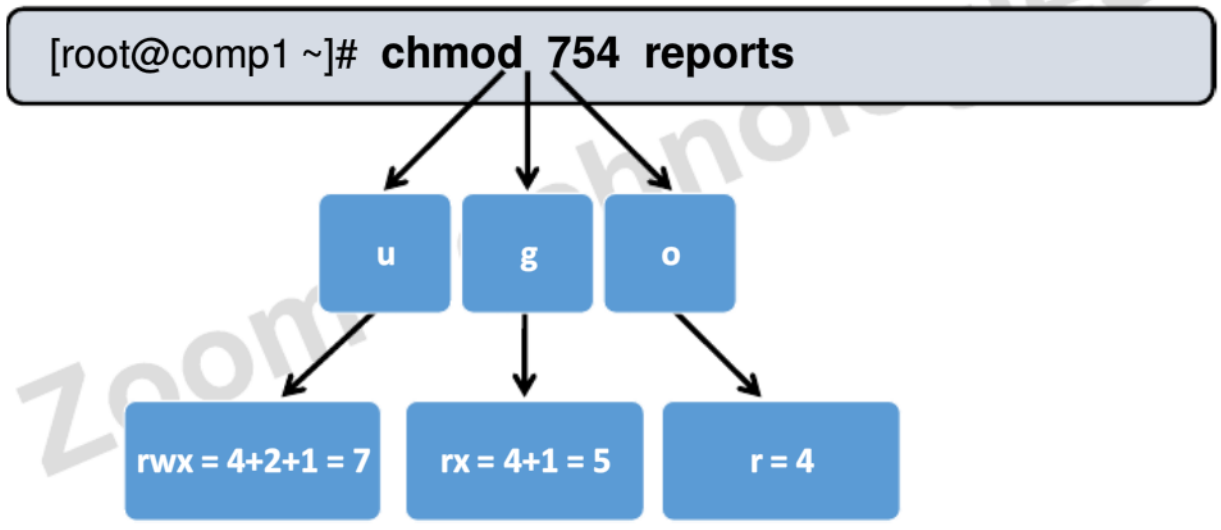
[root@comp1 ~]# **chmod <permissions/weight> <file/directory>**

**Options**

| Category | u (owner) | g (group) | o (others) |
|---|---|---|---|
| Operators | + | - | = |
| Permissions | r | w | x |
| Weights | 4 | 2 | 1 |

## Example of Permission - Absolute

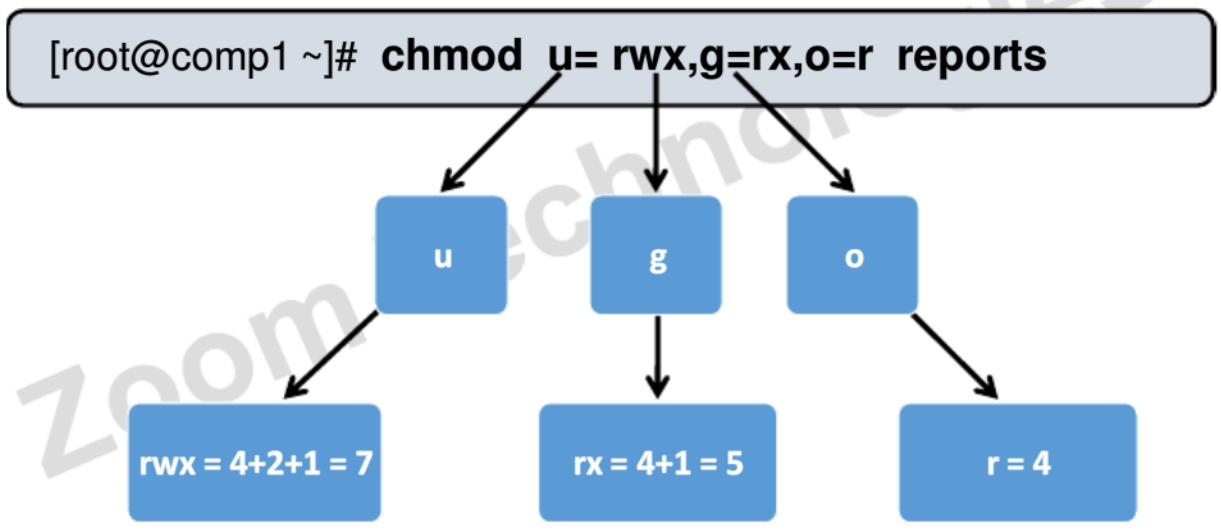
- **Applying permission to Owner (u), Group (g) and Others (o) on the file reports**






## Example of Permission - Symbolic

- **Applying permission to Owner (u), Group (g) and Others (o) on the file reports**



## Changing permissions of an objects

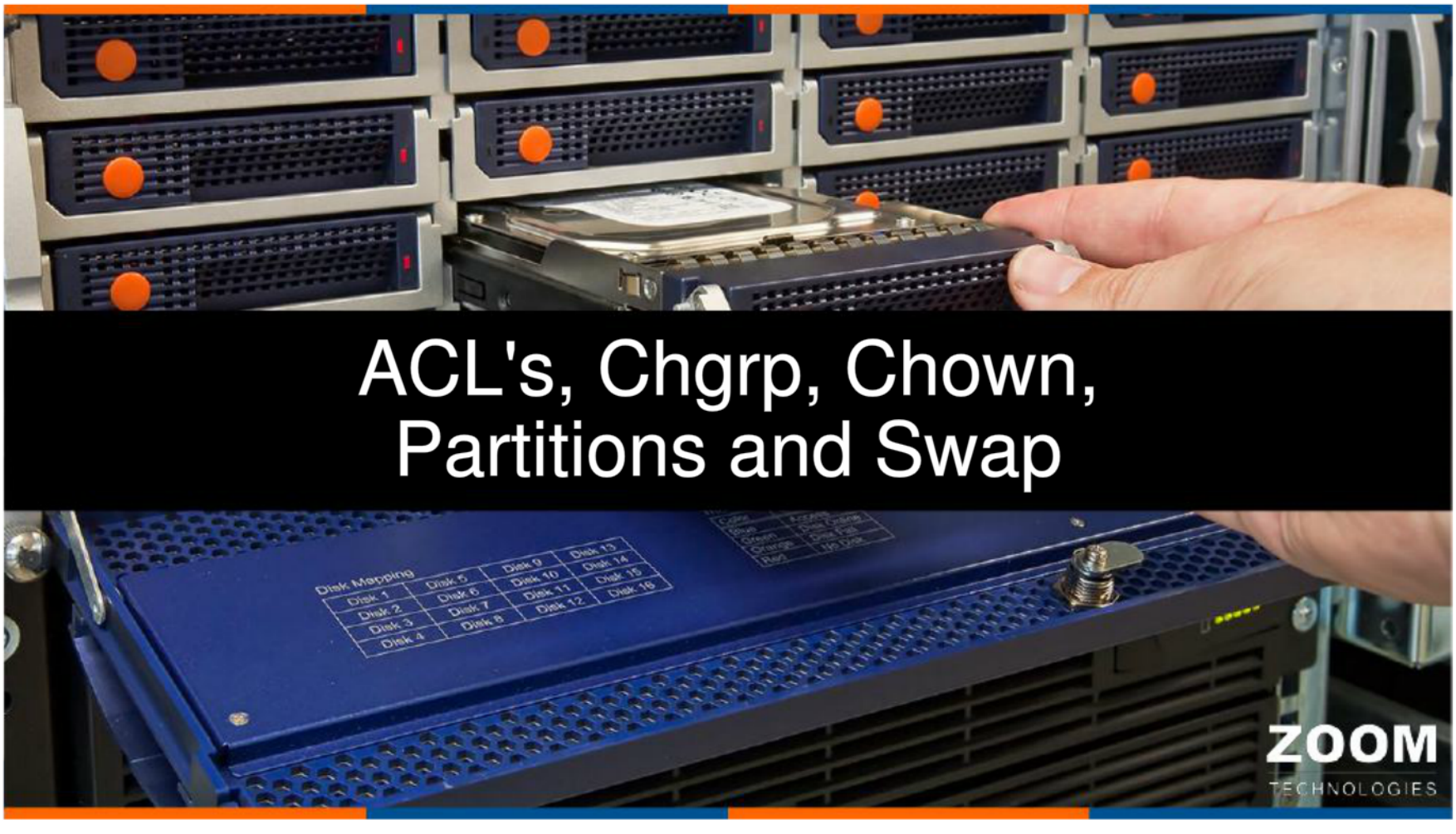
Changing the permissions of an object by using Absolute Mode

[root@comp1 ~]# **chmod <646> <object>**

Changing the permissions of an object by using Symbolic mode

[root@comp1 ~]# **chmod <o+w> <object>**






# Access Control List (ACL)
# Chown and Chgrp

## Access Control List

- Basic file permission can be applied only on the owner, owners primary group and others.
- Access control list (ACL) are created to configure different permissions for different users or groups.
- ACLs can be implemented only on ACL enabled partitions.

- Note: From RHEL 5 Version onwards by default every partition is coming with ACL's.

Assigning permissions for a user

[root@comp1 ~]# **setfacl –m u:<username>:<permission> <file or directory>**

Assigning permission for a group

[root@comp1 ~]# **setfacl –m g:<group name>:<permission> <file or directory>**





To list the applied ACLs on a file or directory

[root@comp1 ~]# **getfacl <file or directory>**

To remove an ACL for a user from a file or directory

[root@comp1 ~]# **setfacl -x u:<username><file or directory>**

To remove an ACL for a group from a file or directory

[root@comp1 ~]# **setfacl -x g:<group name> <file or directory>**

## Changing ownership and group ownership

Changing the ownership of a file or directory

[root@comp1 ~]# **chown <username> <file /dir>**

Changing the group ownership of a file or directory

[root@comp1 ~]# **chgrp <groupname> <file /dir>**



## Partitions

- A partition is a logical division of a hard disk.
- The purpose of partition to store data.
- Partition is use to secure data and also to appearance of having separate hard drives for file management and multiple users.
- In Linux there are some default file systems to format the partitions such as ext2, ext3 ext4, xfs and vfat, etc.
- In Linux there are some default tools to update new changes of partitions to the kernel such as partx, kpartx and partprobe.





## Partitioning Tools

- Pre-Installation tool
  - Disk Druid
- Post-Installation tools
  - fdisk
  - parted

## Naming Convention of Hardware Devices

| | |
|---|---|
| Sata Hardisk | /dev/sda |
| IDE Hardisk | /dev/hda |
| DVD-RW | /dev/sr0 |
| Pendrive or USB | /dev/sdb, ... |



## View the List of Partitions

View the list of partitions

[root@comp1 ~]# **fdisk -l <device name>**

## Disk Management Using fdisk

Disk Management

[root@comp1 ~]# **fdisk <device name>**





## Disk Management

```
[root@comp1~]# fdisk /dev/sda
Disk /dev/sda: 250 GB, 36507222016 bytes, 71303168
sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x000dc8aa  m  command (m for help):
Command action

   d     delete a partition
   m     print this menu
   n     add a new partition
   p     print the partition table
   q     quit without saving changes
   w     write table to disk and exit
```

## Updating the Partition Table

Update the partition table without restarting

[root@comp1 ~]# **partprobe <device name>**





## Formatting

Formatting the partition using ext4 file system

[root@comp1 ~]# **mkfs.ext4 <partition>**

Formatting the partition using xfs file system

[root@comp1 ~]# **mkfs.xfs <partition>**

Formatting the partition using vfat file system

[root@comp1 ~]# **mkfs.vfat <partition>**

## Mounting

Create a directory for mounting the partition

[root@comp1 ~]# **mkdir <directory name>**

Mounting the partition on the directory created

[root@comp1 ~]# **mount <partition> <directory name>**

Unmount the filesystem

[root@comp1 ~]# **umount <directory name>**



## View Disk Information

To view available free space of a disk

[root@comp1 ~]# **gnome-system-monitor &**

To view the free space in a partition

[root@comp1 ~]# **df -hT**

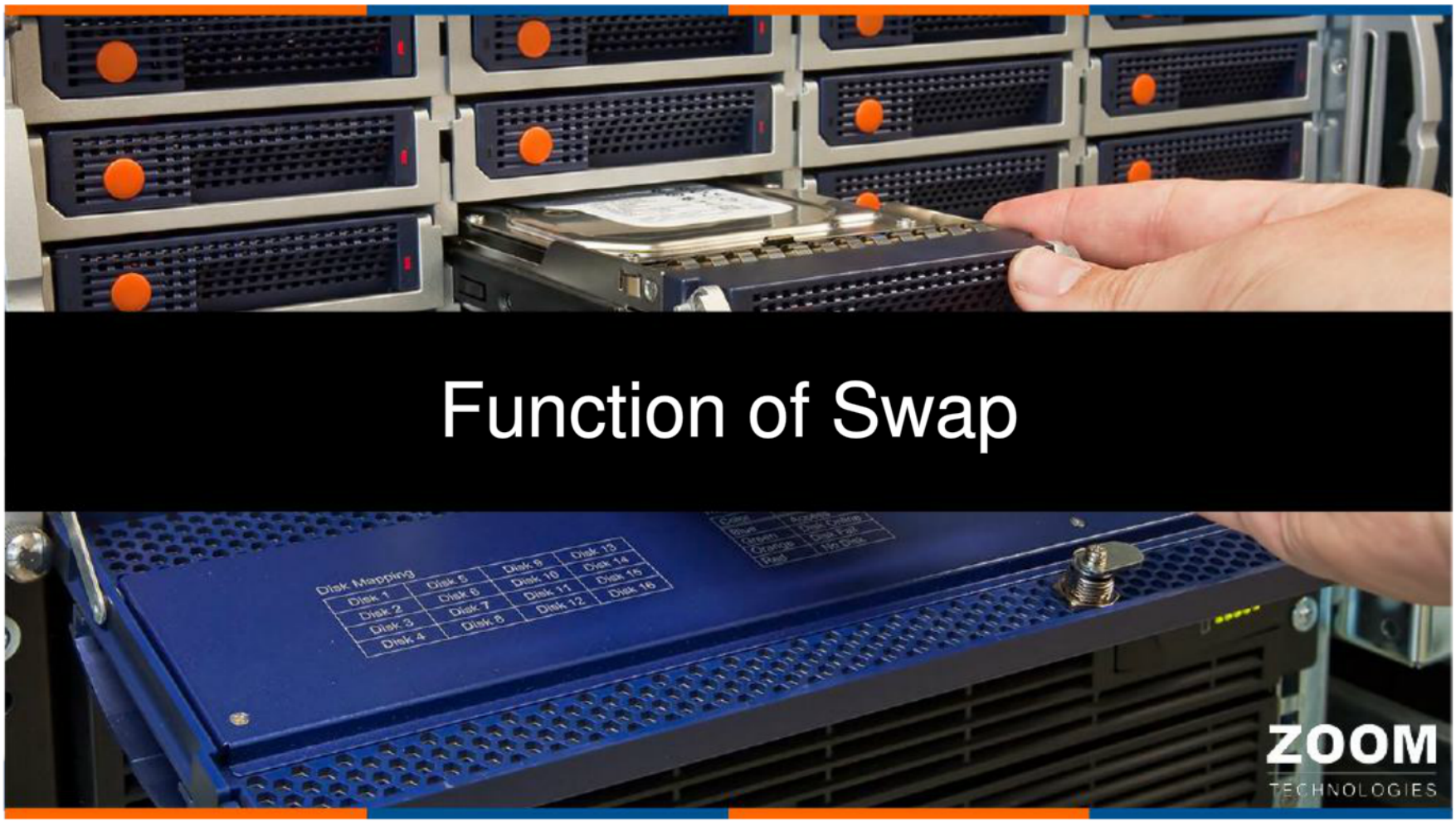
To view the total amount of used space in a partition / directory

[root@comp1 ~]# **du -sh**


# Swap File System

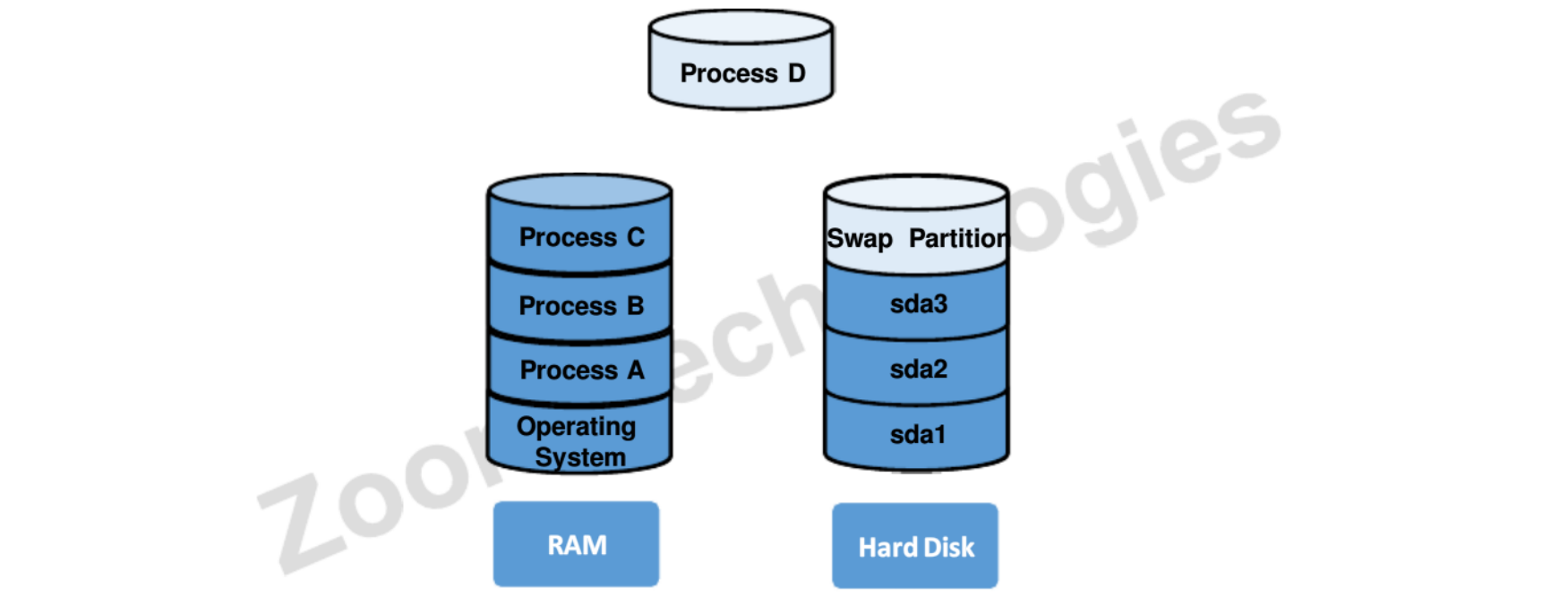
## Swap filesystem

- Swap is a virtual file system which is use to increase the logical RAM memory.
- The use of swap partition it ovoid the interruption in working process.
- It allow user to run multiple programs simultaneously without any downtime.
- It recommended to use swap partition twice to physical RAM size.
- It's similar to the windows swap file only instead of using an actual file, Linux uses a partition on the hard drive.




# Function of Swap

## How Swap Works



## Creating a Swap Partition

Create a new partition

[root@comp1 ~]# **fdisk <device>**

Format the partition as swap

[root@comp1 ~]# **mkswap <partition>**

Turn on swap

[root@comp1 ~]# **swapon <partition>**



## Swap Partition

Check the status of swap used

[root@comp1 ~]# **swapon -s <partition>**

Turn off swap

[root@comp1 ~]# **swapoff <partition>**

## Mounting a Partition Permanently

To mount a partition permanently

[root@comp1 ~]# **vi /etc/fstab**





## Disk Management

```
# This file is edited by fstab-sync - see 'man fstab-sync' for details
LABEL=/1                /           ext4    defaults                    0 0
/dev/sda1               /boot       ext4    defaults                    1 2
LABEL=/home1            /home       ext4    defaults                    0 0
none                    /proc       proc    defaults                    0 0
none                    /sys        sysfs   defaults                    0 0
/dev/sda2               /usr        ext4    defaults                    0 0
LABEL=/var1             /var        ext4    defaults                    1 2
LABEL=SWAP-hda7         swap        swap    defaults                    0 0
/dev/sdb1               /media/dvdrom  auto  pamconsole,noauto,managed   0 0
/dev/sda10              /mnt        ext4    defaults                    0 0
```

To mount dvdrom drive

```
[root@comp1 ~]# mount /dev/sr0 /media
```

To mount a pen drive

```
[root@comp1 ~]# mount /dev/sdb1 /mnt
```


# Disk Quotas



- Quotas are used to restrict the amount of hard disk space occupied by a user or a group.
- Group level quota can only be applied to primary groups.
- Quotas can only be applied on quota enabled partitions.
- Users repeatedly exceed their quotas or consistently reach their soft limits, a system administrator has a few choices to make depending on what type of users they are and how much disk space impacts their work. The administrator can either help the user determine how to use less disk space or increase the user's disk quota.

## Disk Quotas

ZOOM TECHNOLOGIES

**Quotas can be applied in two ways:**

- **Based on the number of inodes (number of files).**
- **Based on the number of blocks (volume of hard disk space).**
- **To apply blocks quota block size of partition is needed.**

To find Block size of Partition

[root@comp1 ~]# **blockdev --getbsz <partition no.>**





## Quotas Limits

ZOOM TECHNOLOGIES

**There are two Quotas limits:**

- **Soft – Soft quota limits will only warn the user that they have reached their quota limits.**
- **Hard – Hard quota limits will not allow the user to create any more files or directories once the quota limit has been reached.**

## Steps to Apply Quotas

- Create a new partition.
- Format the partition.
- Create an directory.
- Mount the partition on the directory with quotas enabled.
- Give full permissions to the partition.
- Create the quota database file.
- Turn on the quotas.
- Assign the quotas to the users or groups.





## Applying Quotas on a Partition

To mount the partition with quotas enabled

[root@comp1 ~]# **mount -o usrquota,grpquota <partition name> <mount point>**

Generate the quota database file

[root@comp1 ~]# **quotacheck -cugv <mount point>**

**Options**

| | | | |
|---|---|---|---|
| **-c** | **Create new database** | **-g** | **Group** |
| **-u** | **User** | **-v** | **Verbose** |

## Applying Quotas on a Partition

Turn on the quota

[root@comp1 ~]# **quotaon <mount point>**

Assigning quotas to users and groups

[root@comp1 ~]# **edquota -u <user name>**

or

[root@comp1 ~]# **edquota -g <group name>**



Applying Quotas on a Partition

**Disk quotas for user <username> (uid <uid>)**

| filesystem | soft | hard | blocks | soft | hard | inodes |
|---|---|---|---|---|---|---|
| /dev/hda9 | 0 | 0 | 0 | 0 | 0 | 0 |

LINUX

## Finding the result by login as a user

To find result login as a user and try to add objects

[root@comp1 ~]# **su - username**



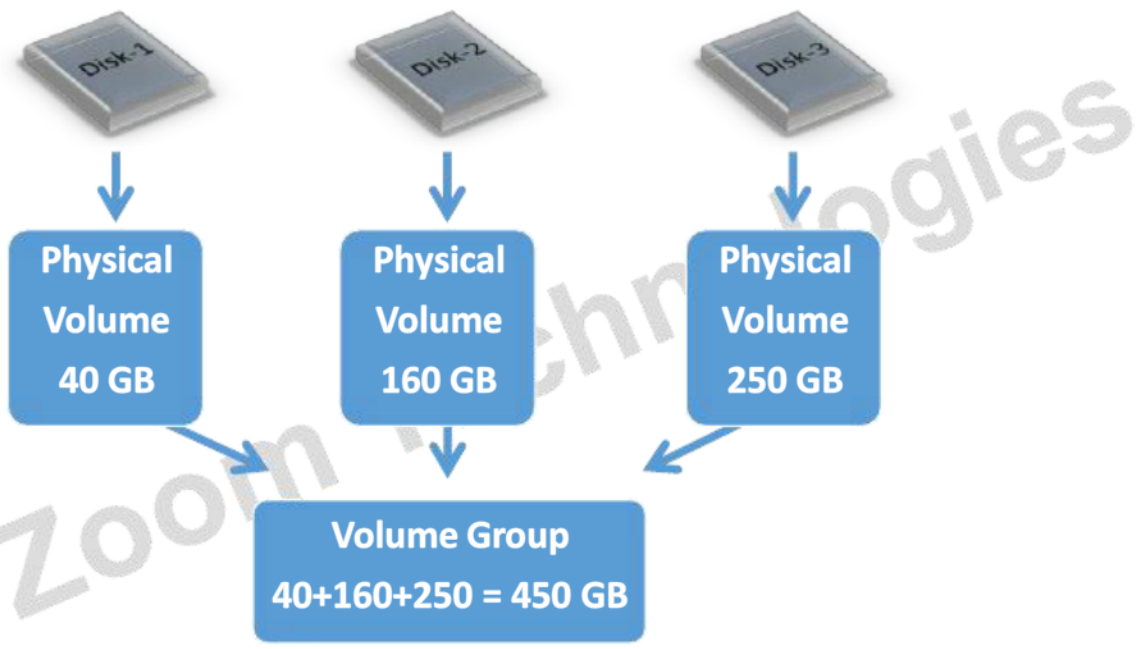
## Logical Volume Manager (LVM)

- LVM is a method of allocating hard drive space into logical volumes that can be easily resized.
- With LVM, the hard drive or set of hard drives is allocated to one or more physical volumes.
- The physical volumes are then combined into volume groups.
- Each volume group is divided into logical volumes, which are formatted with a file system like ext3 and are then mounted.

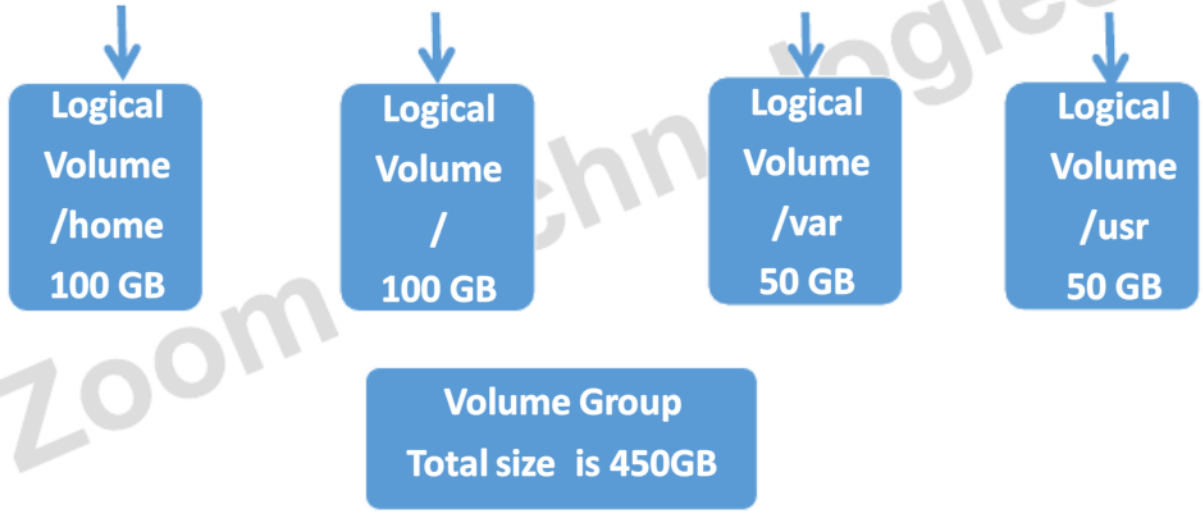




## Logical Volumes



## Logical Volumes








## Creating Partitions

Make multiple partitions

[root@comp1 ~]# **fdisk <device>**

Update the partition table

[root@comp1 ~]# **partprobe <device>**

## Physical Volume

Create a physical volume from the previously created partitions

[root@comp1 ~]# **pvcreate <partition1> <partition2> <partition3>**

To see the physical volume details

[root@comp1 ~]# **pvdisplay |less**





## Volume Group

Create a volume group

[root@comp1 ~]# **vgcreate <volume group name> <physical volume1> <physical volume 2>**

To see the volume group details

[root@comp1 ~]# **vgdisplay <volume group name>**

Create logical volume

[root@comp1 ~]# **lvcreate -L <size> <volume group name> –n <volume name>**

Format the logical volume

[root@comp1 ~]# **mkfs.ext4 <volume name>**





Create a mount point

[root@comp1 ~]# **mkdir <directory name>**

Mounting a logical volume

[root@comp1 ~]# **mount <volume name> <mount point>**

Resizing a logical volume

[root@comp1 ~]# **lvresize -L <+sizeM> <logical volume name>**

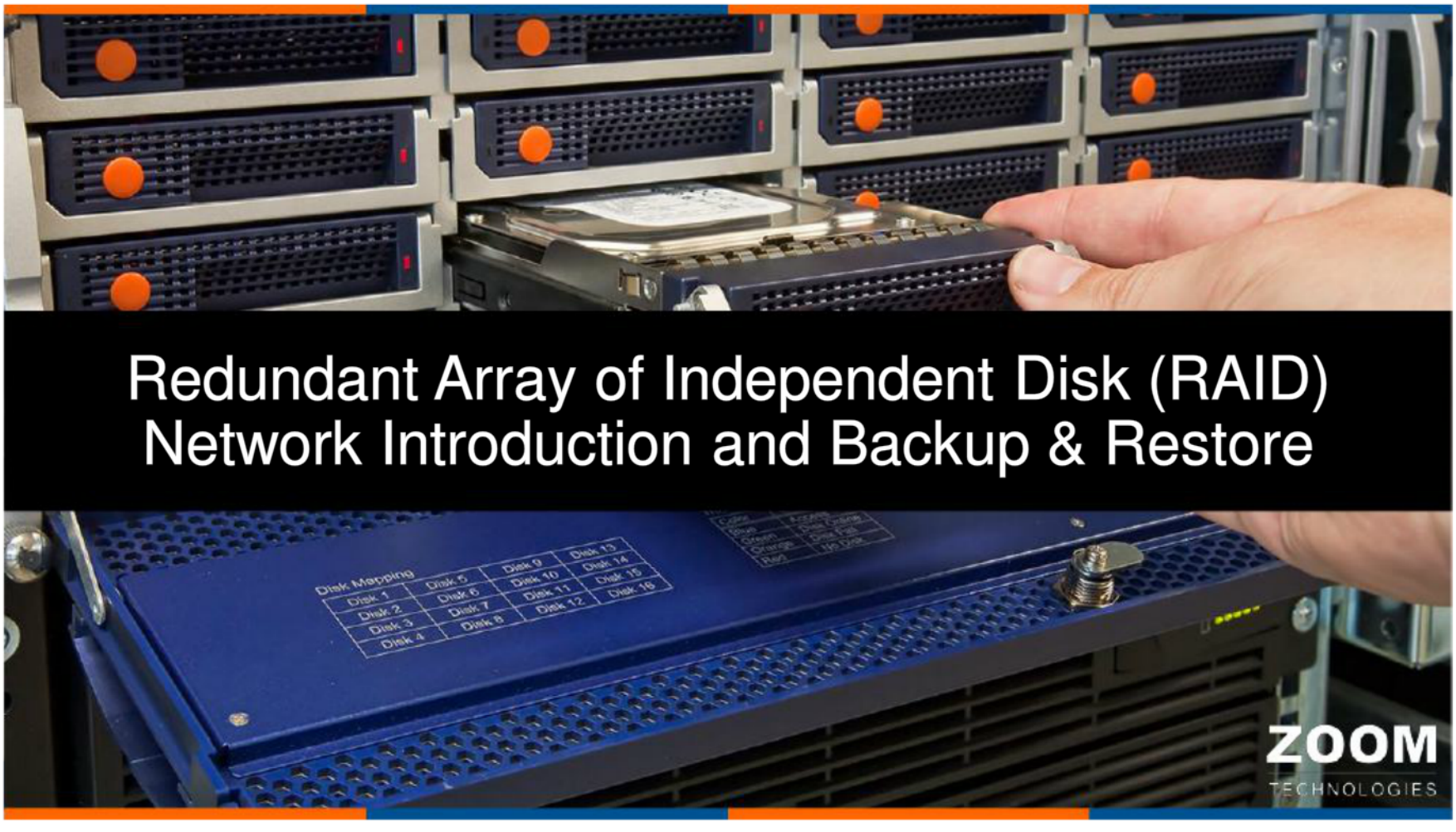
To update the resized logical volume

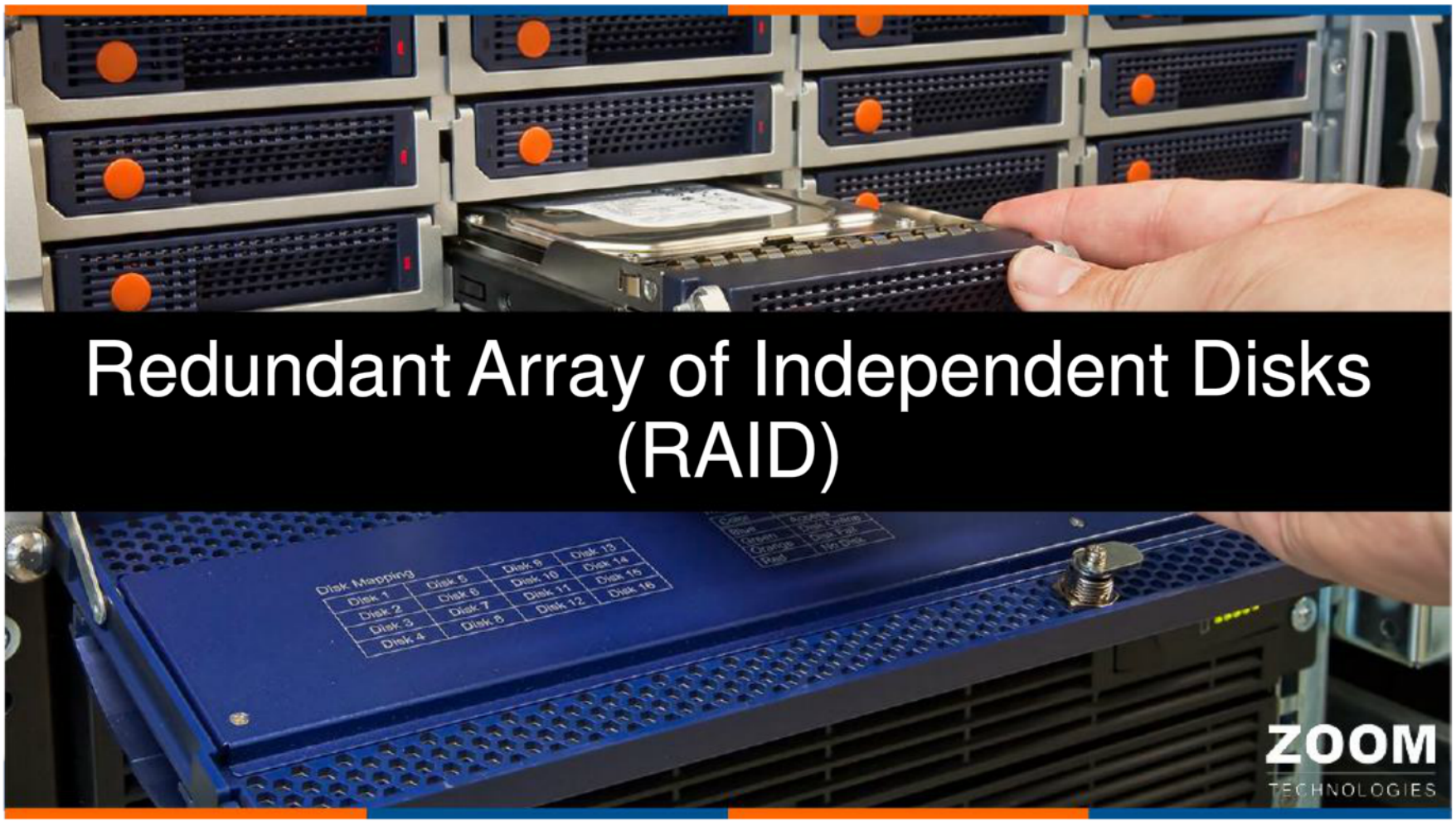
[root@comp1 ~]# **resize2fs <logical volume name>**

Extending the size of a volume group

[root@comp1 ~]# **vgextend <volume group name> <physical volume name>**








# Redundant Array of Independent Disks (RAID)



- RAID is a technology that employs the simultaneous use of two or more partitions on the same or different hard disk drives to achieve greater levels of performance and reliability.
- An Advantage of Raid to prevent data loss.
- It is a fault tolerance mechanism in which the data is not lost even if one of the disk fails.
- It is a Parity mechanism in which the data backup is maintain in Raid array.

## Types of RAID

- Hardware RAID
- Software RAID





## RAID Levels

- RAID 0 (striping without parity)
- RAID 1 (disk mirroring)
- RAID 4 (parity)
- RAID 5 (striping with parity)

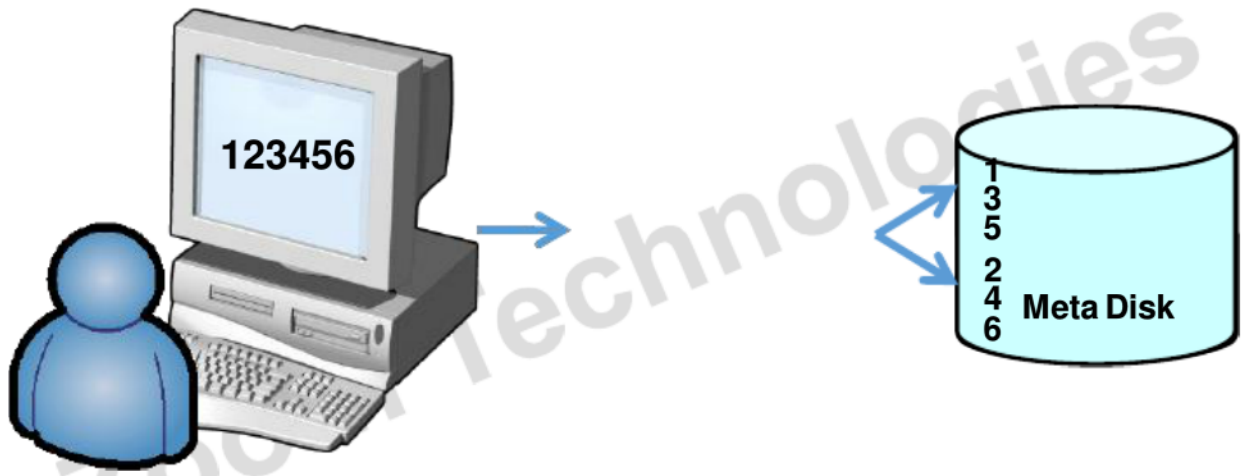
## RAID 0

- Minimum 2 hard disks required.
- Can support maximum 32 hard disks.
- Data is written simultaneously and evenly across the multiple hard disks.
- The reading and writing speed is faster.
- Fault tolerance is not available.





## How RAID 0 Works



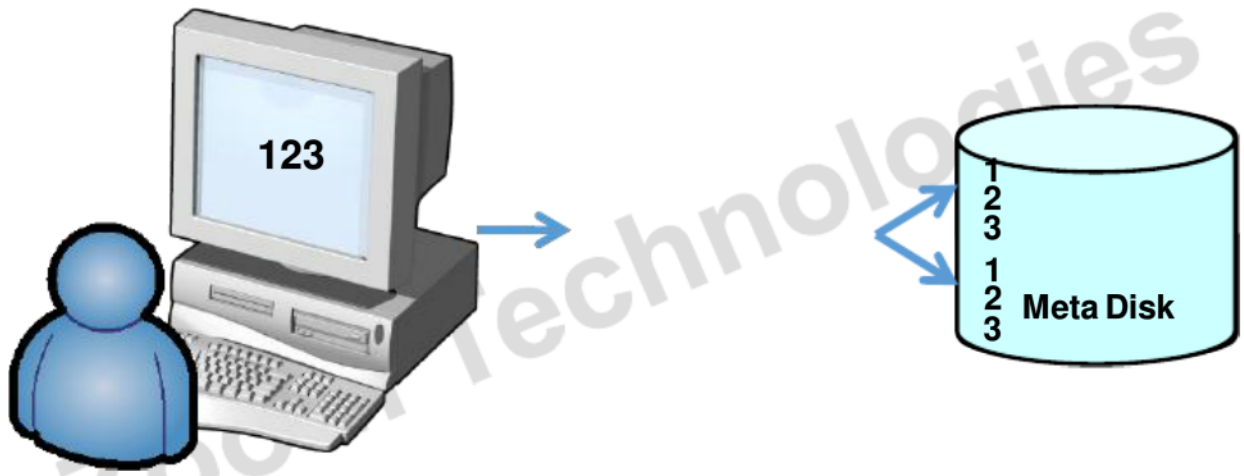
## RAID 1

- Works with only 2 hard disks.
- Same data is simultaneous written on both the disk.
- The reading speed is fast and the writing speed is slow.
- Fault tolerance is available.
- Overhead is 50%





## How RAID 1 Works



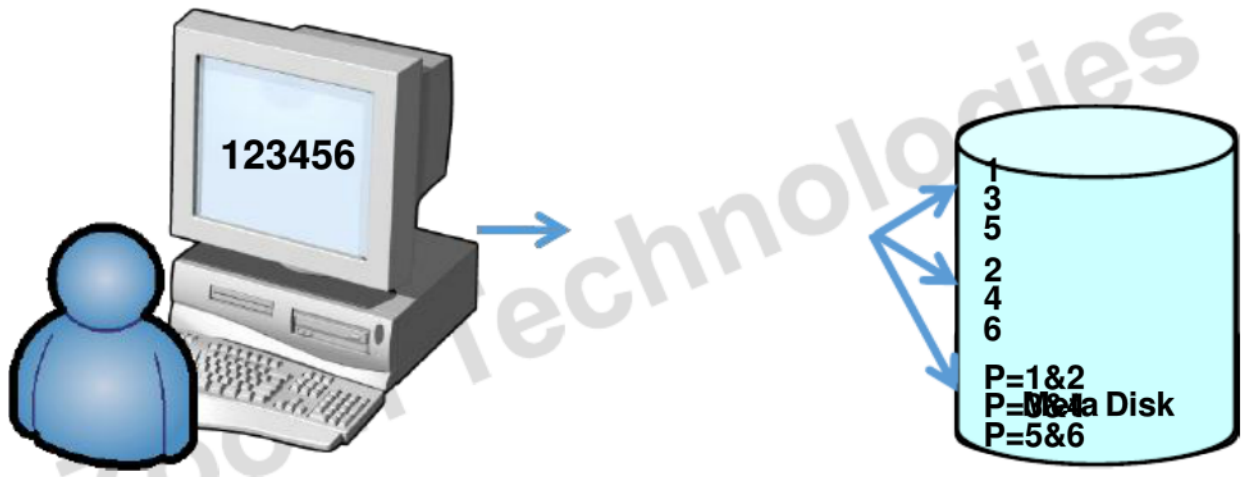
## RAID 4

- Minimum 3 hard disks required.
- Can support maximum 32 hard disks.
- One of the disk is reserved for parity.
- Data is written simultaneously and evenly across the remaining disks.
- The reading and writing speed is fast.
- Fault tolerance is available.
- Overhead 1 hard disk





## How RAID 4 Works




Zoom Technologies

LINUX

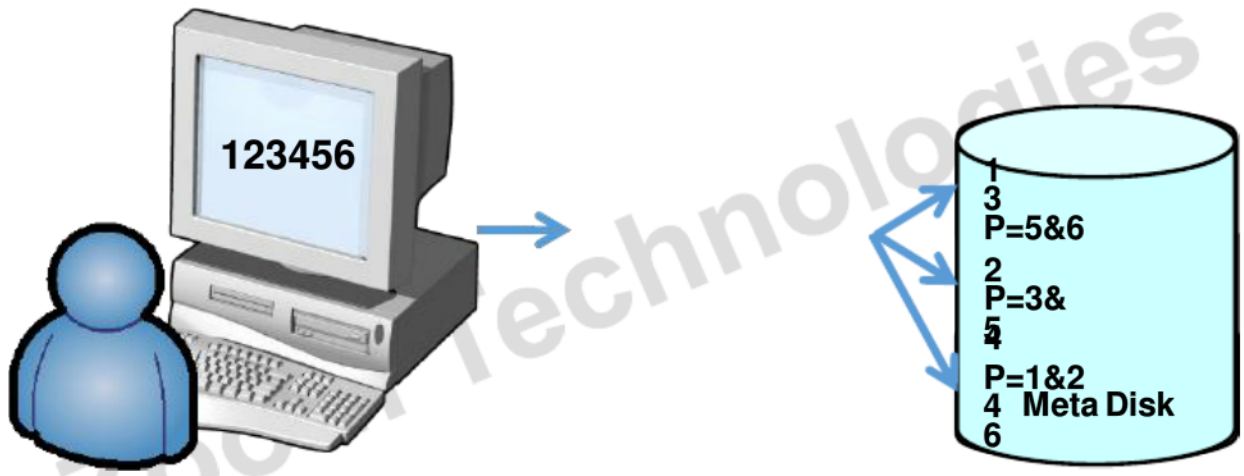
## RAID 5

- Minimum 3 hard disks required.
- Can support maximum 32 hard disks.
- Data is written simultaneously and evenly across multiple hard disks.
- The parity is written equally on all disks.
- The reading and writing speed is fast.
- Fault tolerance is available.



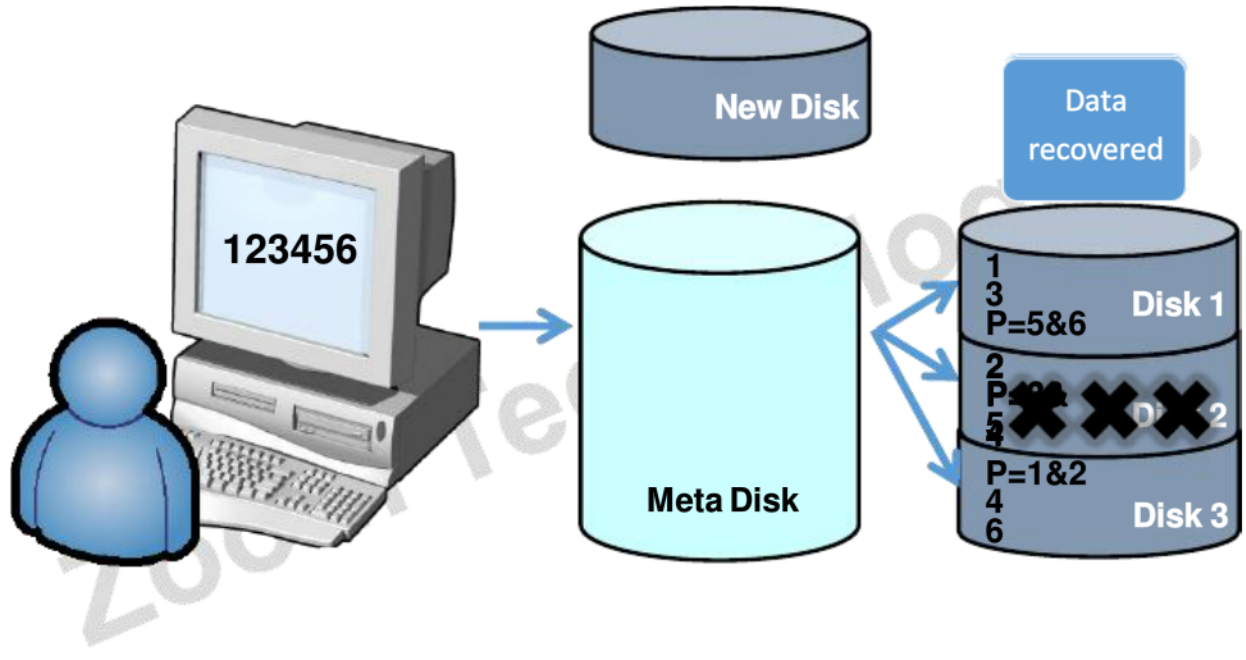


## How RAID 5 Works




Zoom Technologies

## Data Recovery




LINUX

## Creating Partitions

Make multiple partitions

[root@comp1 ~]# **fdisk <device>**

Update the partition table

[root@comp1 ~]# **partprobe <device>**

LINUX

To club all partitions into a RAID array

[root@comp1 ~]# **mdadm -C /dev/md0 -n<No. of partitions> <partition 1> <partition 2> <partition 3> -l<level>**

Formatting the RAID device

[root@comp1 ~]# **mkfs.ext4 /dev/md0**

Making a mount point

[root@comp1 ~]# **mkdir <directory name>**



RAID Commands

Mounting the RAID partition

[root@comp1 ~]# **mount /dev/md0 <directory name>**

To make a partition faulty

[root@comp1 ~]# **mdadm -f /dev/md0 <faulty partition>**

To remove a partition from the RAID array

[root@comp1 ~]# **mdadm -r /dev/md0 <partition>**

LINUX

Add a new partition to the RAID array

[root@comp1 ~]# **mdadm -a /dev/md0 <new partition >**

To display the RAID device

[root@comp1 ~]# **mdadm -D /dev/md0**

To stop the RAID

[root@comp1 ~]# **mdadm -S /dev/md0**
Note: First it has to be unmounted before it can be stopped.





To assemble a RAID

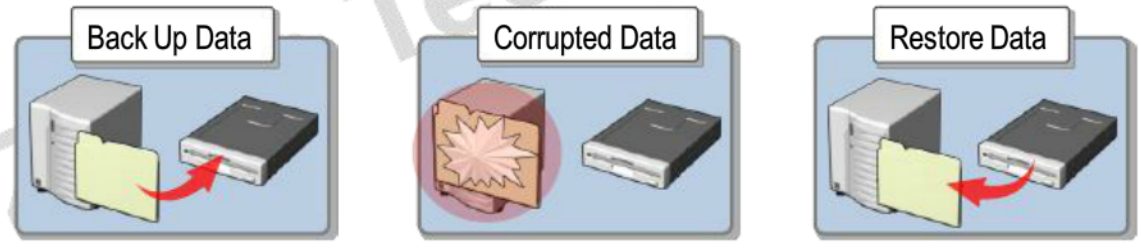
[root@comp1 ~]# **mdadm -A /dev/md0 <partition1> <partition2> <partition3>**


# Backup & Restore

## Backup

- **Backup is the process of copying the data to another location.**
- **It is used to prevent the loss of data.**
- **Users can take a backup only of their own data.**
- **The complete backup can only be taken by root.**





## Commands for Backup

- Tar (Tape Archive)
- CPIO
- Gun zip (z)
- Bun zip (j)





## Backup using tar Command

To backup and restore using tar commands

[root@comp1 ~]# **tar <options> <destination> <source>**

**Options**

| | | | |
|---|---|---|---|
| **-c** | **Create** | **-t** | **Table of content** |
| **-x** | **Extract / restore** | **-z** | **gunzip** |
| **-v** | **Verbose** | **-j** | **bunzip** |
| **-f** | **File** | | |

## Backup using cpio Command

To backup using cpio commands

[root@comp1 ~]# **ls –d <file/dir> | cpio <option>> <destination>**

**Options**

| | | | |
|---|---|---|---|
| **-o** | **output** | **-t** | **Table of content** |
| **-i** | **input** | | |
| **-v** | **Verbose** | | |
| **-f** | **File** | | |





## Restore using cpio Command

To read backup file using cpio commands

[root@comp1 ~]# **cpio <option> < <destination>**

To restore the backup file using cpio commands

[root@comp1 ~]# **cpio <option> < <destination>**


# Network Introduction

## Hostname Configuration

Assigning a hostname - temporarily

[root@server ~]# **hostname <computer name>**

Assigning a hostname - permanently

[root@server ~]# **vi /etc/hostname**

**hostname**

## IP Address Assignment

IP Addresses can be:

- Static IP Address
  - Address that are manually assigned and do not change over time.
- Dynamic IP Address
  - Addresses that are automatically assigned for a specific period of time and can change after this period is over.





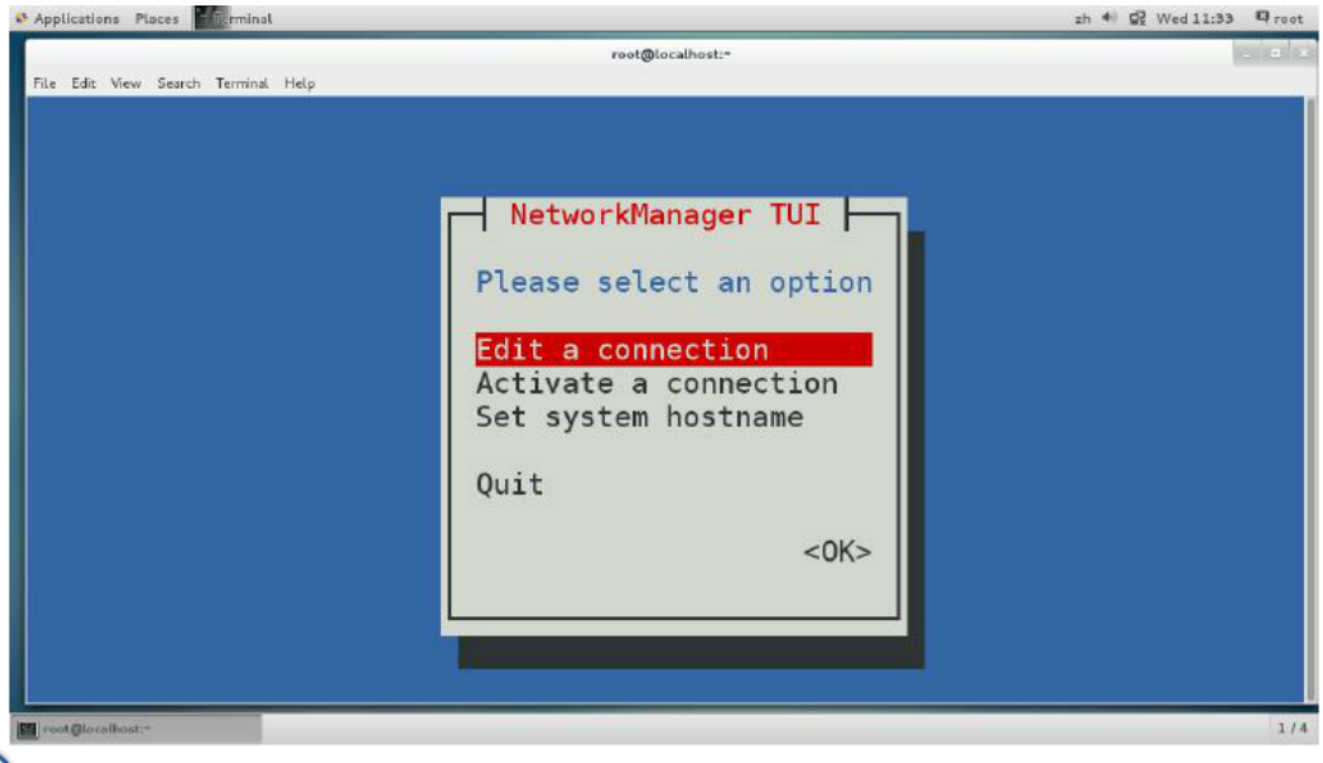
## Static IP Address Configuration

To assign IP address - temporarily

```
[root@server ~]# ifconfig enp1s7 <ip address>
```

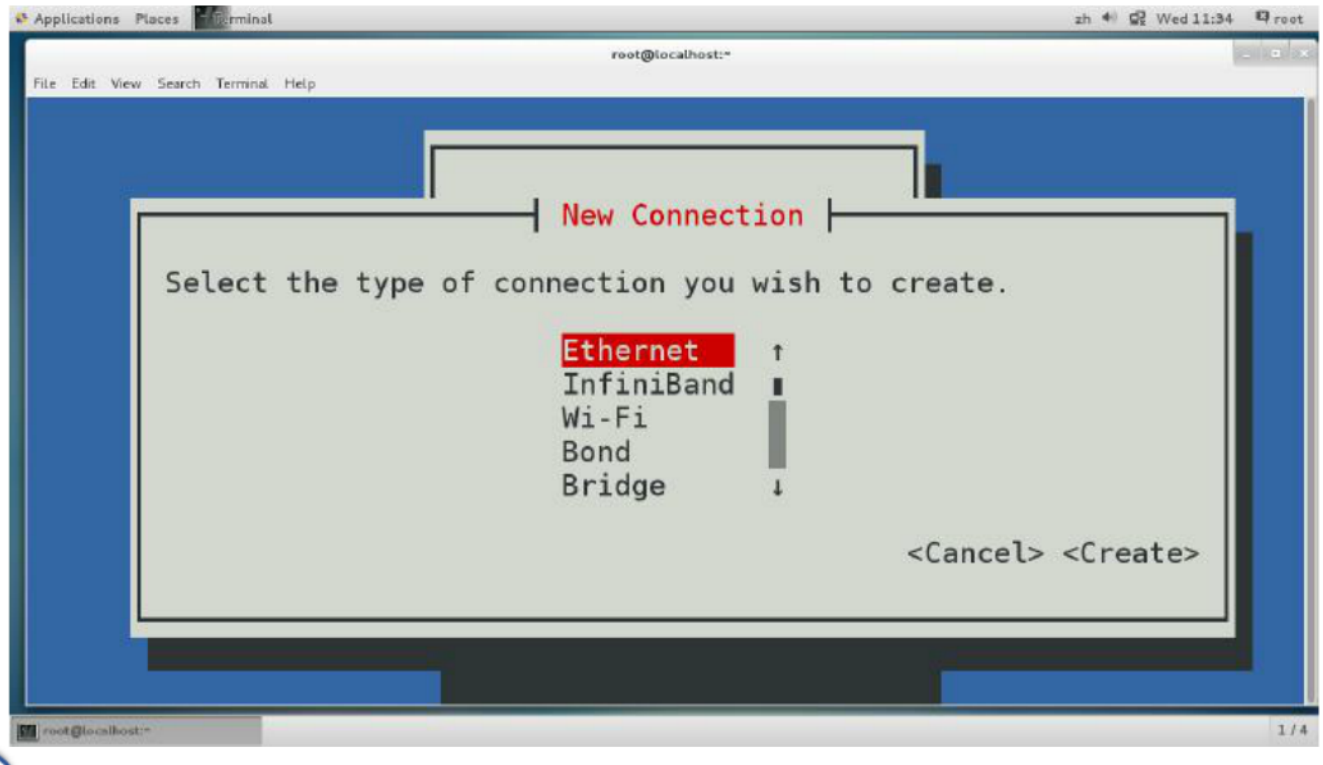
Assign an IP address - permanently

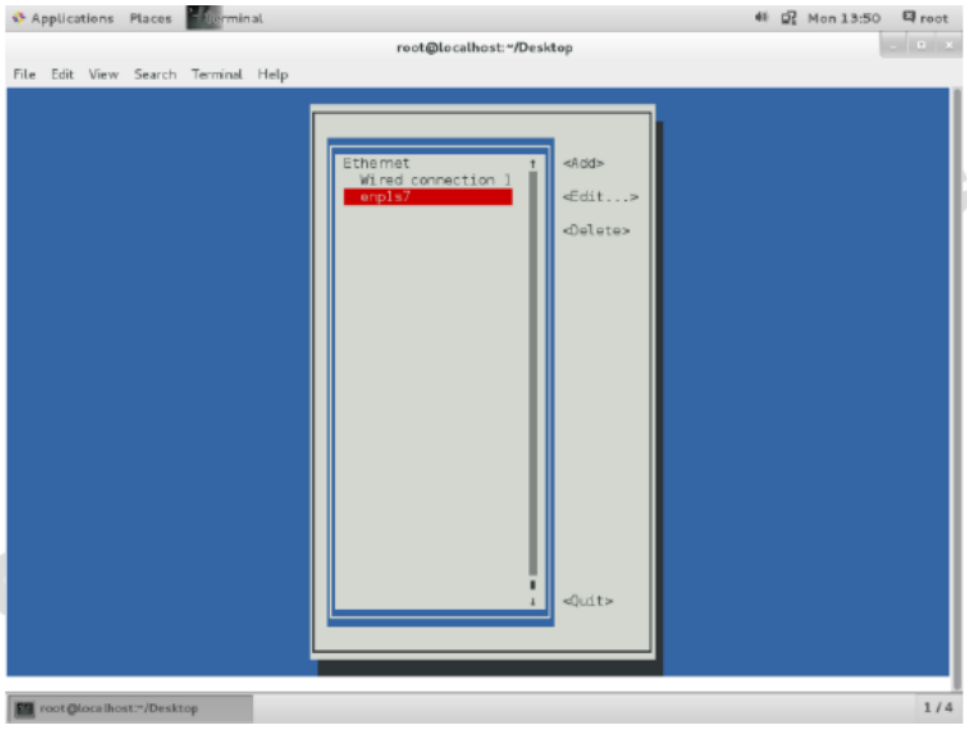
```
[root@server ~]# nmtui
```


Applications Places Terminal
zh Wed 11:33 root
root@localhost:~
File Edit View Search Terminal Help
NetworkManager TUI
Please select an option
Edit a connection
Activate a connection
Set system hostname
Quit
<OK>
root@localhost:~
1 / 4



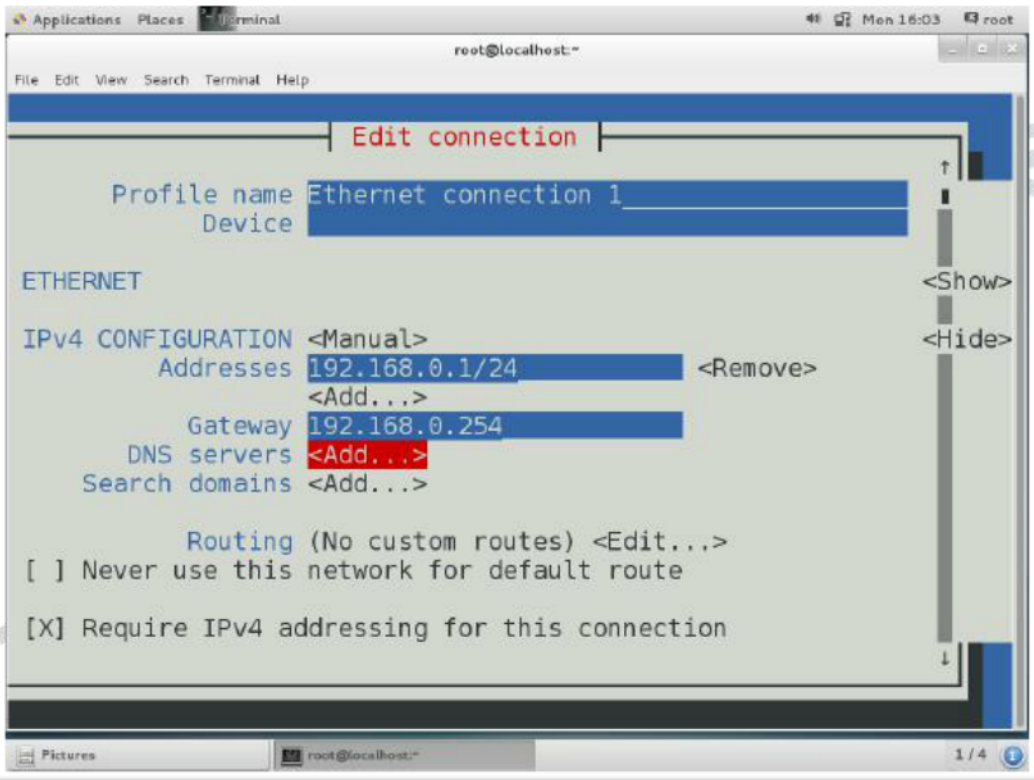



Applications Places Terminal
zh Wed 11:34 root
root@localhost:~
File Edit View Search Terminal Help
New Connection
Select the type of connection you wish to create.
Ethernet
InfiniBand
Wi-Fi
Bond
Bridge
<Cancel> <Create>
root@localhost:~
1 / 4


Applications Places Terminal
Mon 13:50
root
root@localhost:~/Desktop
File Edit View Search Terminal Help
Ethernet
Wired connection 1
enp1s7
<Add>
<Edit...>
<Delete>
<Quit>
root@localhost:~/Desktop
1 / 4






Applications Places Terminal
Mon 16:03
root
root@localhost:~
File Edit View Search Terminal Help
Edit connection
Profile name Ethernet connection 1
Device
ETHERNET
<Show>
IPv4 CONFIGURATION <Manual>
<Hide>
Addresses 192.168.0.1/24 <Remove>
<Add...>
Gateway 192.168.0.254
DNS servers <Add...>
Search domains <Add...>
Routing (No custom routes) <Edit...>
[ ] Never use this network for default route
[X] Require IPv4 addressing for this connection
Pictures
root@localhost:~
1 / 4

## IP Address Configuration

ZOOM TECHNOLOGIES

Restart the network services temporary

[root@server ~]# **service network restart**

Restart the network service permanent

[root@server ~]# **systemctl enable network**

To check the IP address

[root@server ~]# **ifconfig**



IP Address Configuration

ZOOM TECHNOLOGIES

To find DNS ip address

[root@server ~]# **cat /etc/resolv.conf**

To find gateway

[root@server ~]# **route -nv**

To edit or to remove an ip address

[root@server ~]# **cd /etc/sysconfig/network-scripts**

LINUX


Package Management and
DHCP Server
Disk Mapping
Disk 1
Disk 2
Disk 3
Disk 4
Disk 5
Disk 6
Disk 7
Disk 8
Disk 9
Disk 10
Disk 11
Disk 12
Disk 13
Disk 14
Disk 15
Disk 16
ZOOM
TECHNOLOGIES

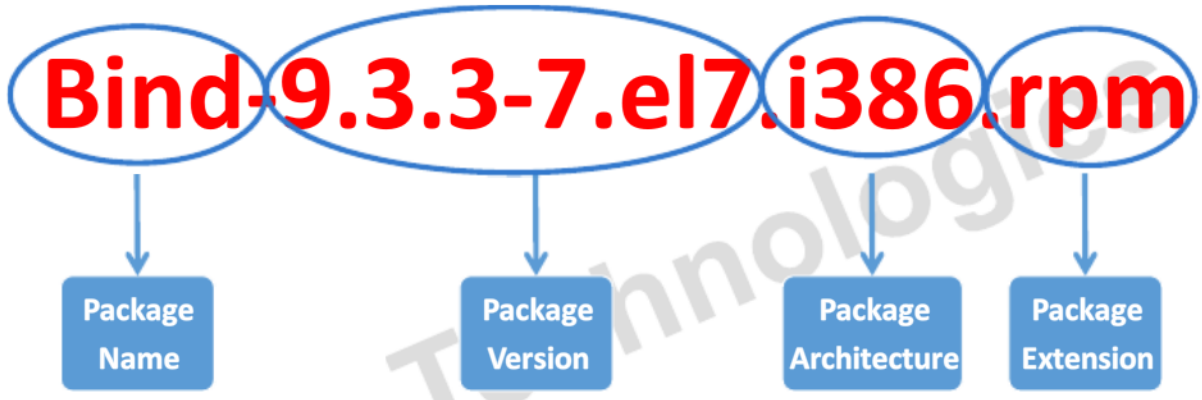

Package Management RPM and YUM
Disk Mapping
Disk 1
Disk 2
Disk 3
Disk 4
Disk 5
Disk 6
Disk 7
Disk 8
Disk 9
Disk 10
Disk 11
Disk 12
Disk 13
Disk 14
Disk 15
Disk 16
ZOOM
TECHNOLOGIES


# Redhat Package Manager (RPM)



- RPM is both a installation method as well as a package format.
- RPM packages were original created of Red Hat Linux, but now can be used on many Linux distributions like CentOS, Fedora, SUSE, Mandriva, etc.
- Using RPM we can
- Install new applications
- Upgrade existing applications
- Remove installed applications
- Query packages

## RPM Label Pattern








## Methods of Installation

- Standalone Method
  - Installing from a Harddisk, CD, DVD or Pendrive
- Network Installation Method
  - Network file service (NFS)
  - File transfer protocol (FTP)

## Standalone Installation

Installing a package

[root@comp1 ~]# **rpm <options> <package name> --force**

**Options**

| | |
|---|---|
| **-i** | **Install** |
| **-v** | **Verbose** |
| **-h** | **Displays the progress in hashes format** |
| **-U** | **Update existing package** |
| **--force** | **Install forcefully** |





## Removing an Installed Package

Removing a package

[root@comp1 ~]# **rpm <options> <package name> --nodeps**

**Options**

| | |
|---|---|
| **-e** | **Erase (uninstall)** |
| **--nodeps** | **Uninstall the package even if other applications are dependent on this application** |

## Querying an Installation

Installing a package

[root@comp1 ~]# **rpm <options> <package name>**

**Options**

**-q** **Query the availability of the package**

**-qa** **Displays all installed packages**

**-qc** **Displays the configuration files of the package**

**-qi** **Displays complete information of the package**

**-ql** **Displays all the files associated with the installed package**





## Network Installation Method - NFS

Create a directory

[root@comp1 ~]# **mkdir <directory name>**

Mount the NFS file system on the directory

[root@comp1 ~]# **mount <NFSserverip>:<path to the package> <mount point>**

To install the package

[root@comp1 ~]# **cd <mount point>**

[root@comp1 ~]# **rpm <option> <package> --force**


# Yellowdog Updater Modified (YUM)



- It is an interactive program use to install, remove, upgrade or query the packages.
- Added from RHEL 5 onwards.
- Yum uses an repository that is xml-based rpm metadata for installation.
- It automatically computes dependencies and figures out what things should occur to install packages.
- It can be used to installed from a local media, ftp server or nfs server.

## Updating the yum configuration file

Provide server IP address and Applications directory in yum file

[root@comp1 ~]# **vi /etc/yum.repos.d/CentOS-Base.repo**





## YUM Command

Installing a package

[root@comp1 ~]# **yum <option> <package name1>* <package name2>***

**Options**

| | |
|---|---|
| **list** | **Displays the list of packages in the repository.** |
| **list installed** | **Displays the packages that are already installed.** |
| **remove** | **To erase or remove a packages.** |
| **install** | **Installs the package from the repository.** |
| **Update** | **To update existing packages** |


# Dynamic Host Configuration Protocol (DHCP Server)

## Dynamic Host Configuration Protocol (DHCP)

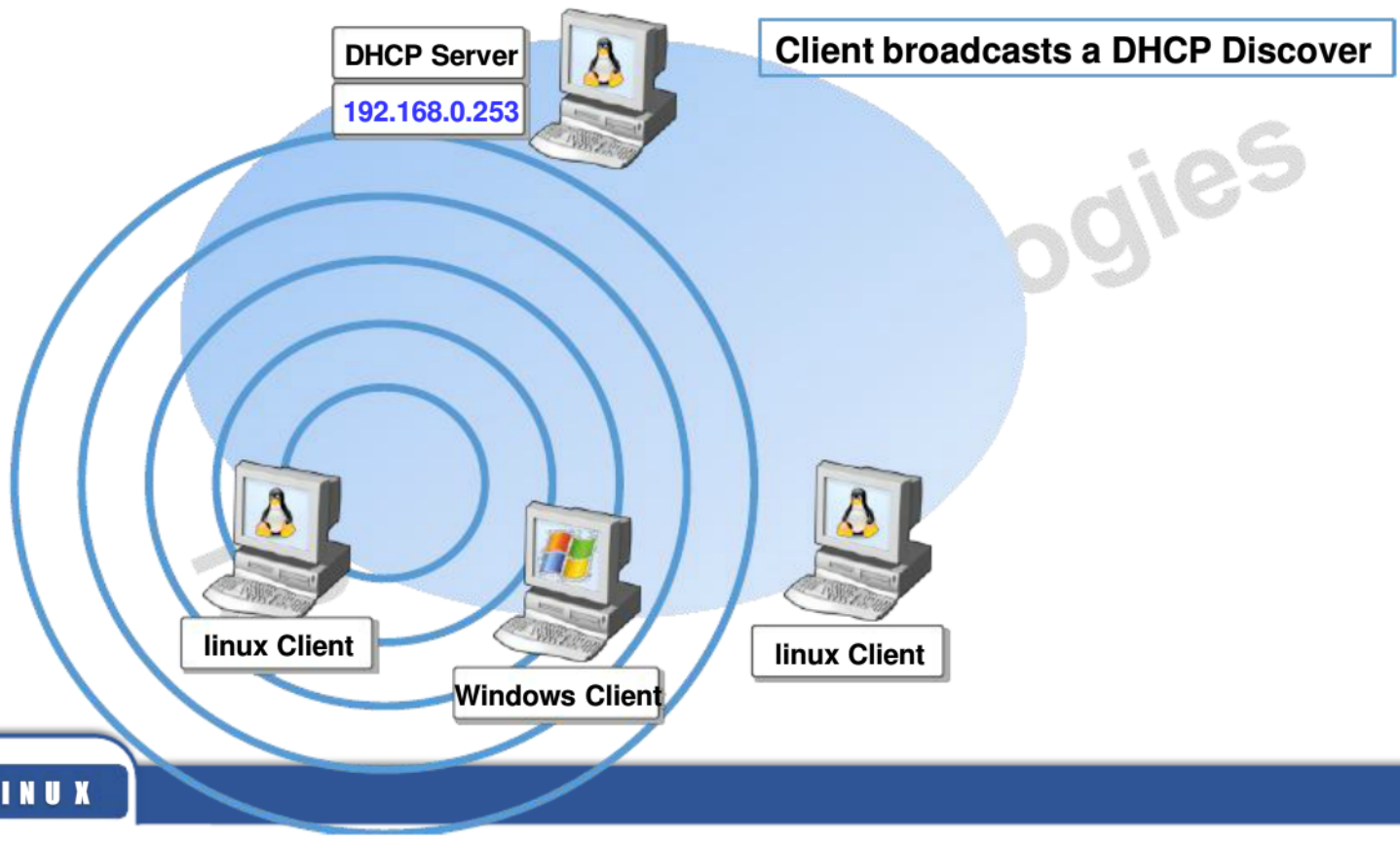
- It assigns IP addresses automatically to the clients.
- It provides centralized IP address management.
- It prevents IP address conflicts.
- DHCP reduces the complexity and amount of administrative work by assigning other TCP/IP configurations along with the IP address.

## Static vs Dynamic

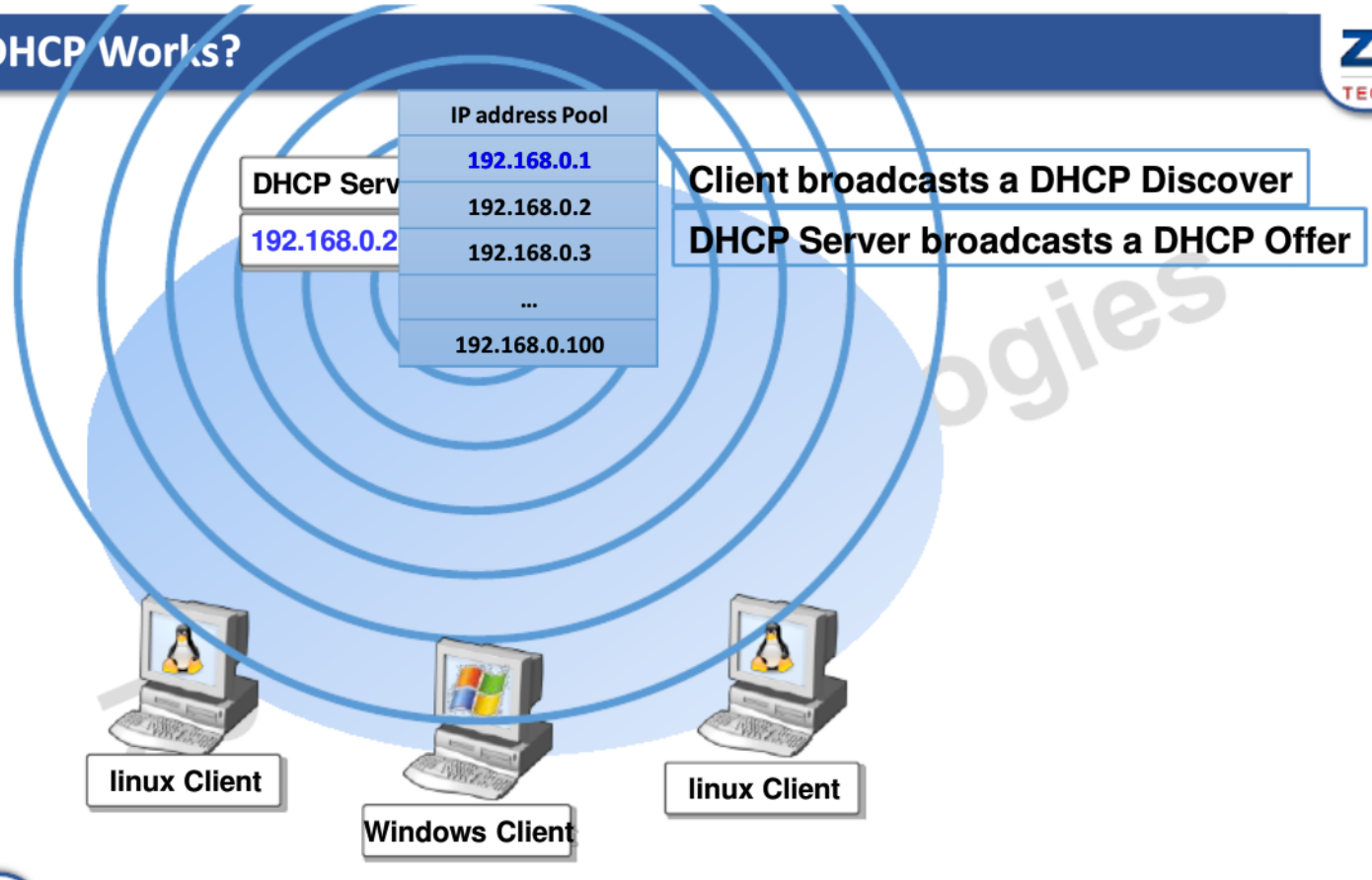
| Static IP Assigning | Dynamic IP Assigning |
| --- | --- |
| • IP addresses are entered manually.<br>• Chances of misconfiguration.<br>• Communication and network problems can result.<br>• Frequent computer moves increase administrative effort. | • IP addresses are assigned automatically.<br>• Correct configuration.<br>• Common network problems are eliminated.<br>• Client configuration is updated automatically |



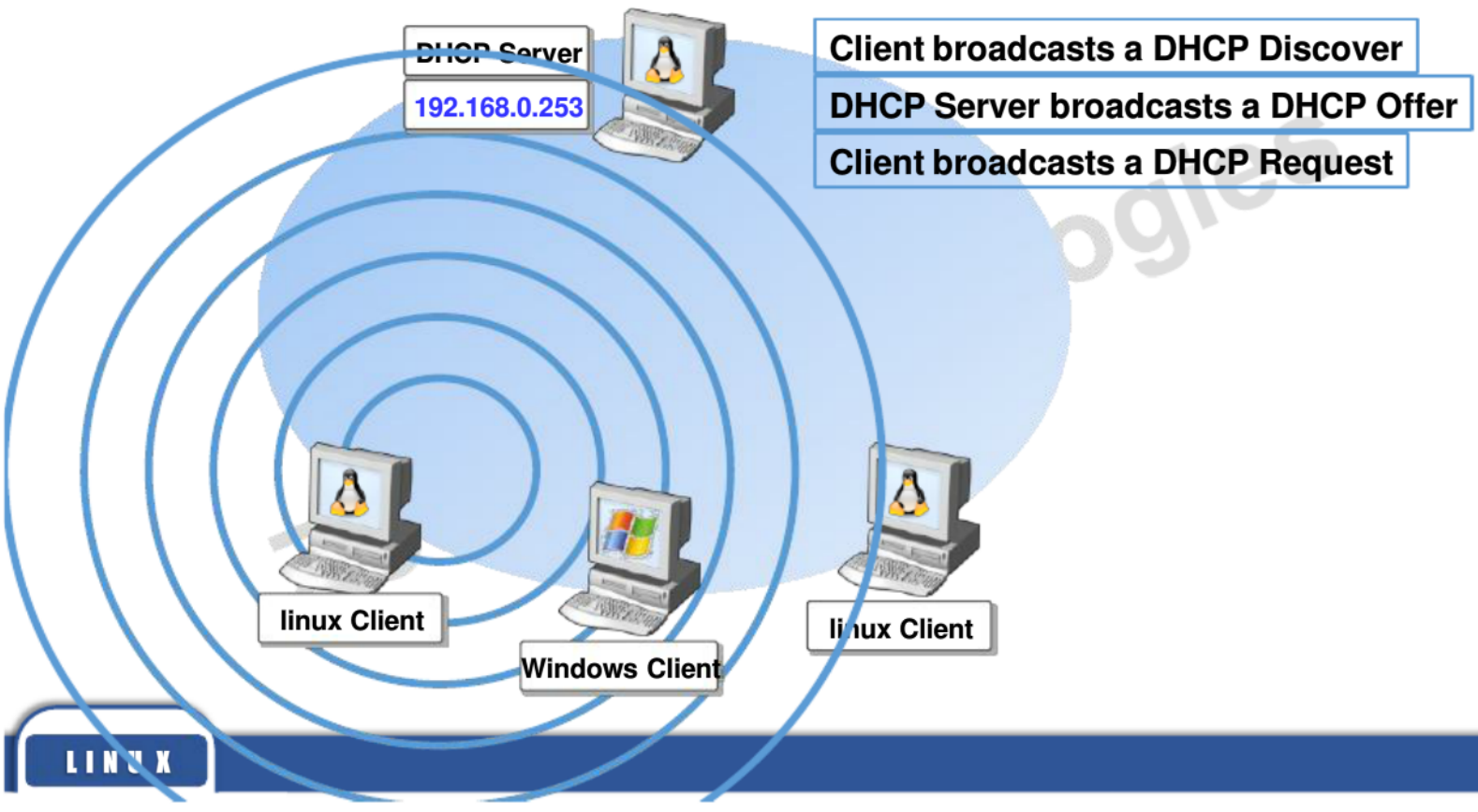
## How DHCP Works?



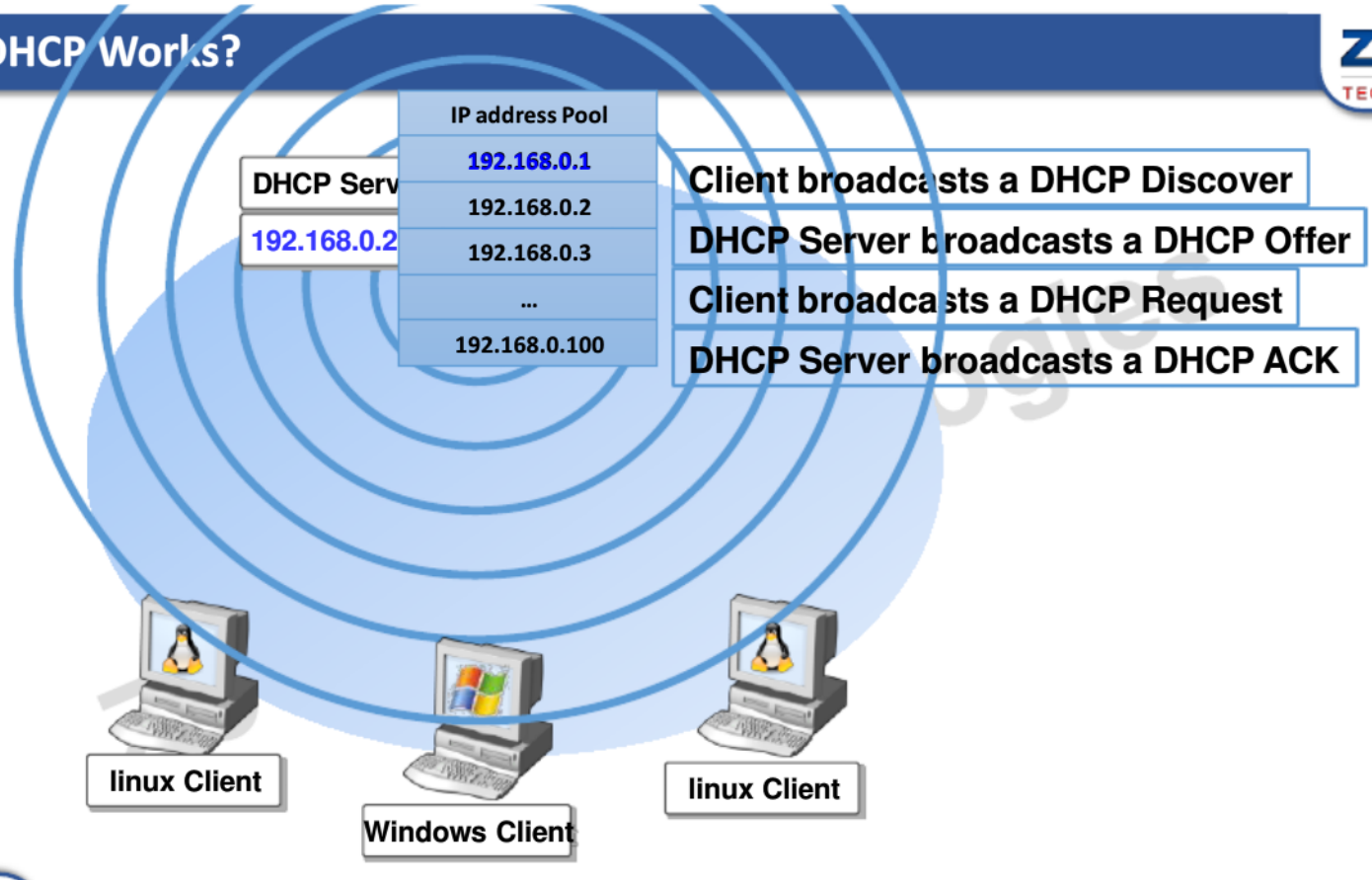
## How DHCP Works?




## How DHCP Works?

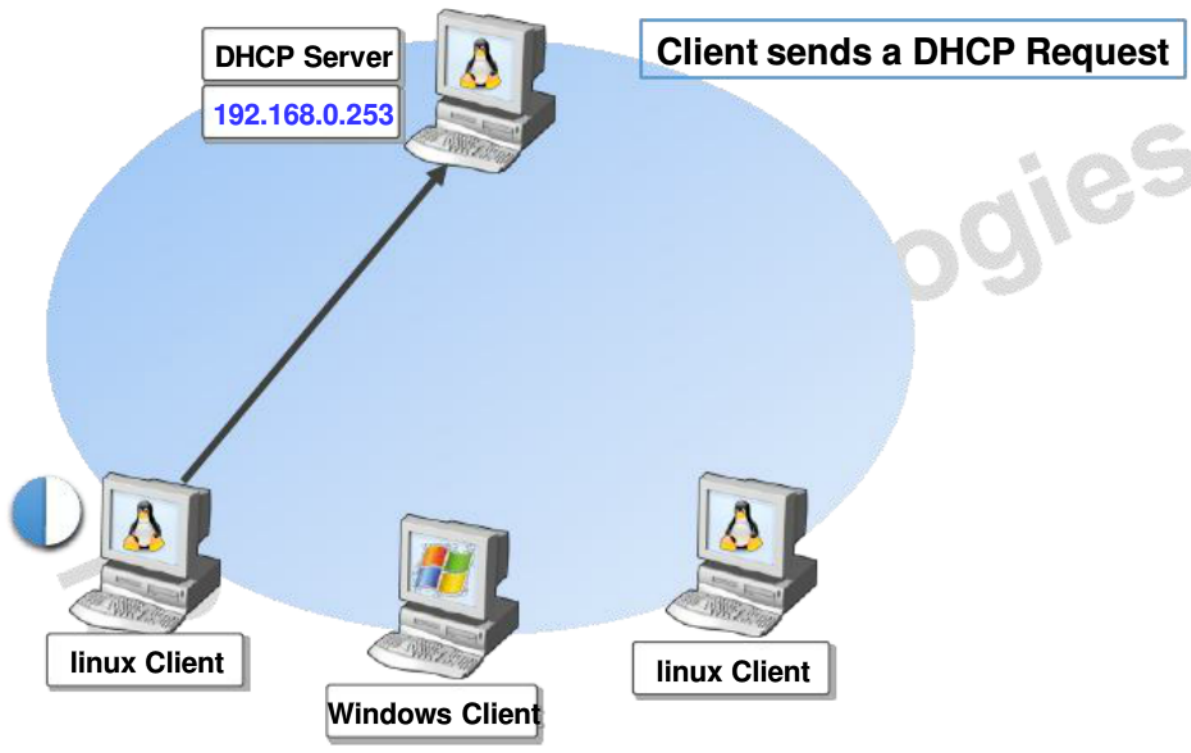


## How DHCP Works?

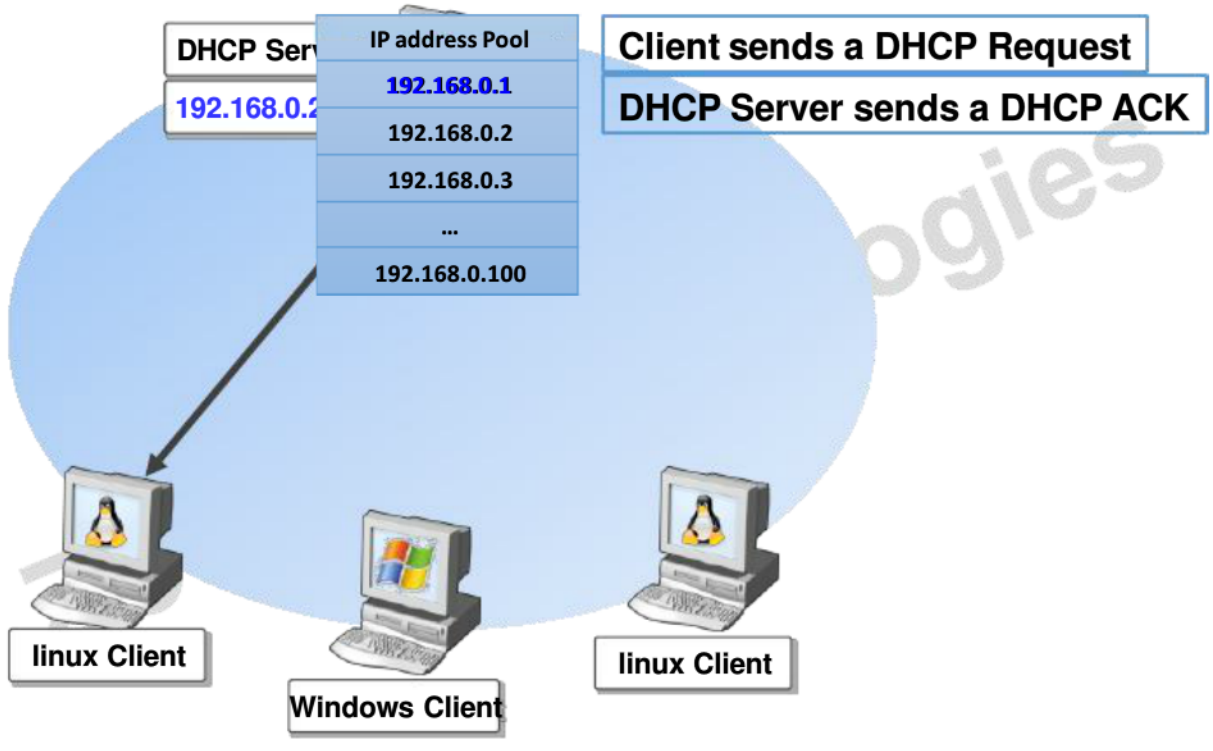





## How DHCP Renewal Works?



## How DHCP Renewal Works?






## DHCP Reservation

- Assigning IP address dynamically has some disadvantage, every time the lease period expires the client system may not get the same IP address.
- The above problem can be solved by doing a DHCP reservation.
- In DHCP reservation the mac-address of the client system is bound to an IP address.

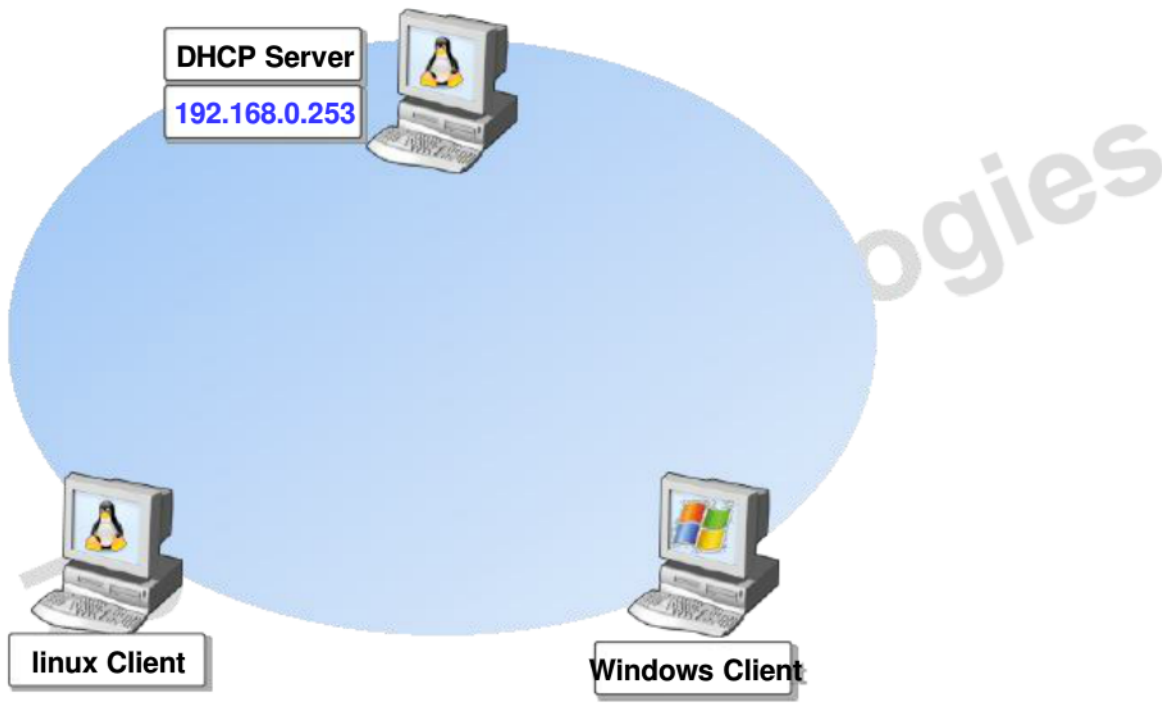
## DHCP Requirements

- **Installation packages**
  - dhcp*
- **Port numbers**
  - 67 Bootp / DHCP client
  - 68 Bootp / DHCP server
- **Configuration file**
  - /etc/dhcp/dhcpd.conf
- **Daemon / Service**
  - dhcpd





## Function of DHCP Server



Install the DHCP packages

[root@dhcpserver ~]# **yum install dhcp* -y**

Location of sample configuration file

**/usr/share/doc/dhcp-4.2.5**

Copy the sample configuration

[root@dhcpserver ~]# **cp /usr/share/doc/dhcp-4.2.5/dhcpd.conf.sample /etc/dhcp/dhcpd.conf**





Edit the configuration file

[root@dhcpserver ~]# **vi /etc/dhcp/dhcpd.conf**

```
subnet 192.168.0.0 netmask 255.255.255.0 {

# --- default gateway
        option routers                  192.168.0.1;
        option subnet-mask              255.255.255.0;
        option nis-domain               "domain.org";
        option domain-name              "domain.org";
        option domain-name-servers 192.168.1.1;
```

```
range dynamic-bootp 192.168.0.1  192.168.0.200;
        default-lease-time 21600;
        max-lease-time 43200;
        # we want the nameserver to appear at a fixed
address
        host ns {
                next-server marvin.zoom.com;
                hardware ethernet 12:34:56:78:AB:CD;
                fixed-address 207.175.42.254;
        }
}
```





Restart the service temporary

[root@dhcpserver ~]# **service dhcpd restart**

Restart the service permanent

[root@dhcpserver ~]# **systemctl enable dhcpd**

## DHCP Client Configuration - Linux

DHCP client configuration - linux

[root@client1 ~]# **dhclient -v**

or

[root@client1 ~]# **nmtui**

**Check the option 'Use Dynamic IP Configuration'**

Restart the services

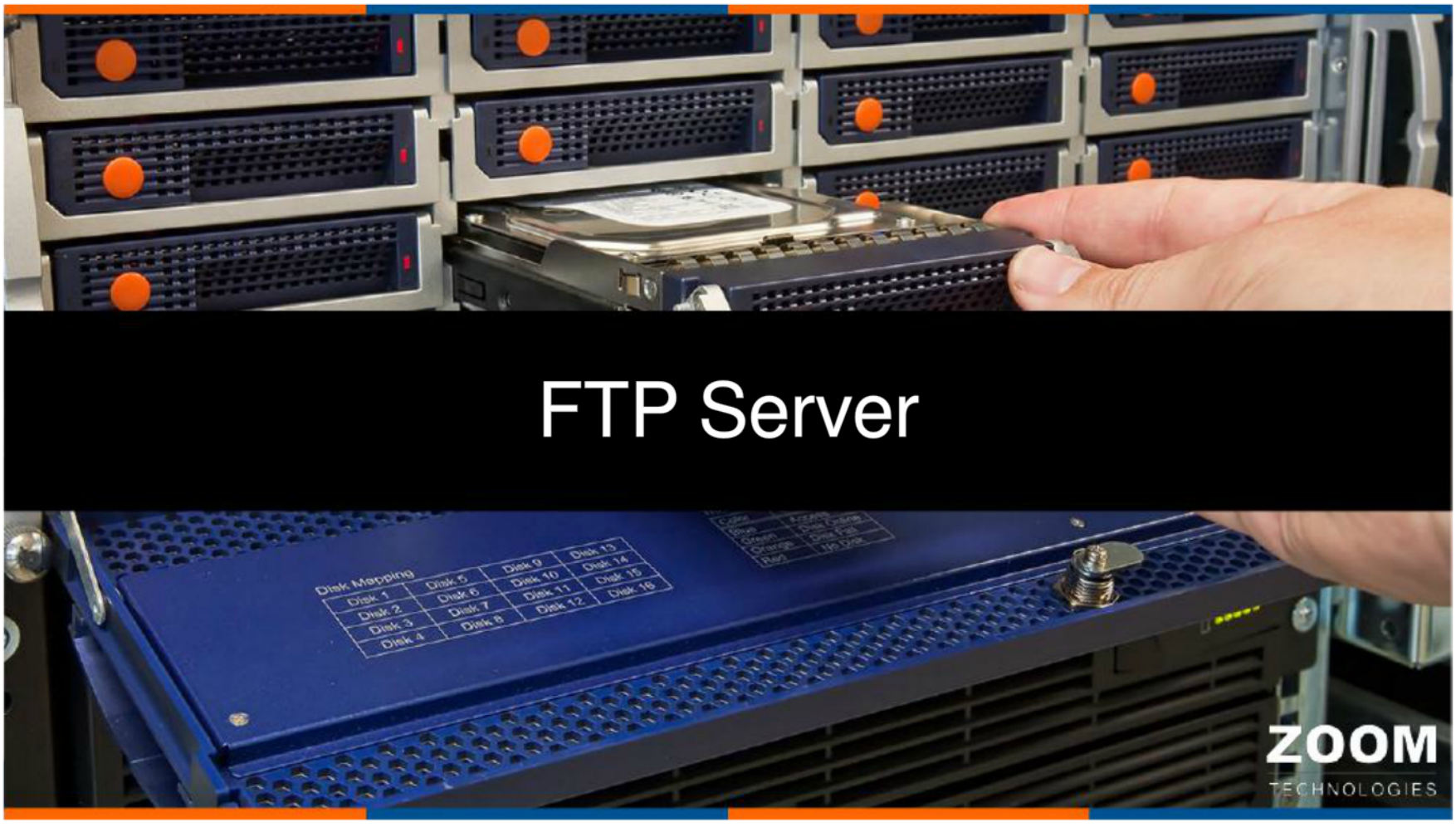
[root@client1 ~]# **service network restart**



## DHCP Client Configuration - Windows

- **On the desktop – right click 'My Network Places'**
- **Select properties**
- **In the window that opens right click on 'Local Area Connection'**
- **Select properties**
- **Double click 'Internet Protocol (TCP/IP)'**
- **Select the option 'Obtain an IP Address Automatically'**
- **Click OK on all open windows**


FTP Server YUM Server and
NFS Server
Disk Mapping
Disk 1
Disk 2
Disk 3
Disk 4
Disk 5
Disk 6
Disk 7
Disk 8
Disk 9
Disk 10
Disk 11
Disk 12
Disk 13
Disk 14
Disk 15
Disk 16
ZOOM
TECHNOLOGIES


FTP Server
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ZOOM
TECHNOLOGIES

## File Transfer Protocol (FTP)

- File Transfer Protocol (FTP) is one of the oldest members of the TCP/IP protocol stack and is still in common use.
- As the name suggests, it is optimized for transferring files.
- FTP server is used to exchange files between computers over network.
- FTP server can be use as a centralized server to maintain all clients data in single system.
- There are some default applications in Linux to configure FTP protocol.

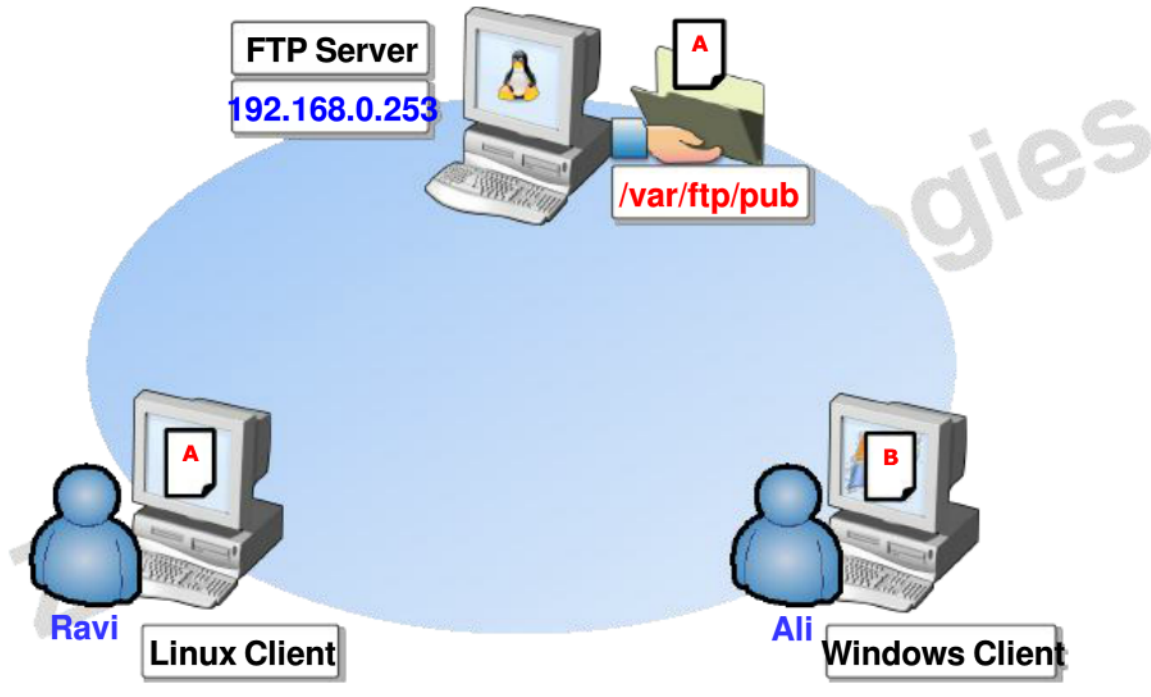




## FTP Server for Linux/Unix

- vsFTPd Very Secure FTP Daemon
- WU-FTP Washington University's (St. Louis)
- Proftpd Professional FTP Daemon

## How FTP works?

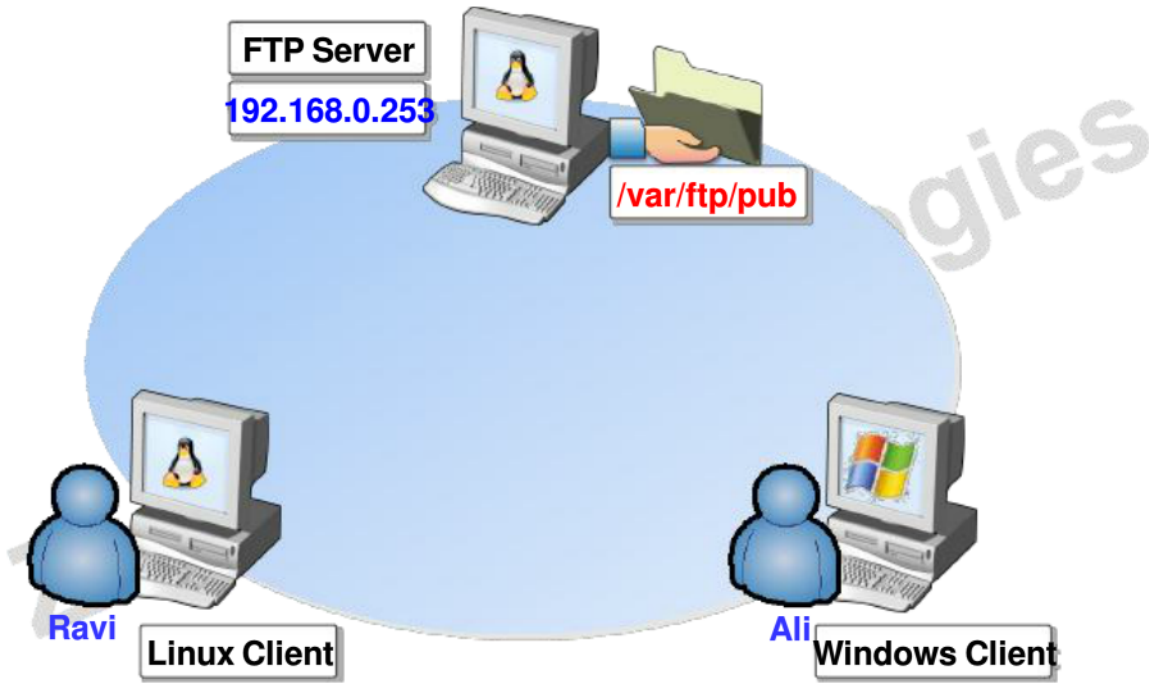





## FTP Requirements

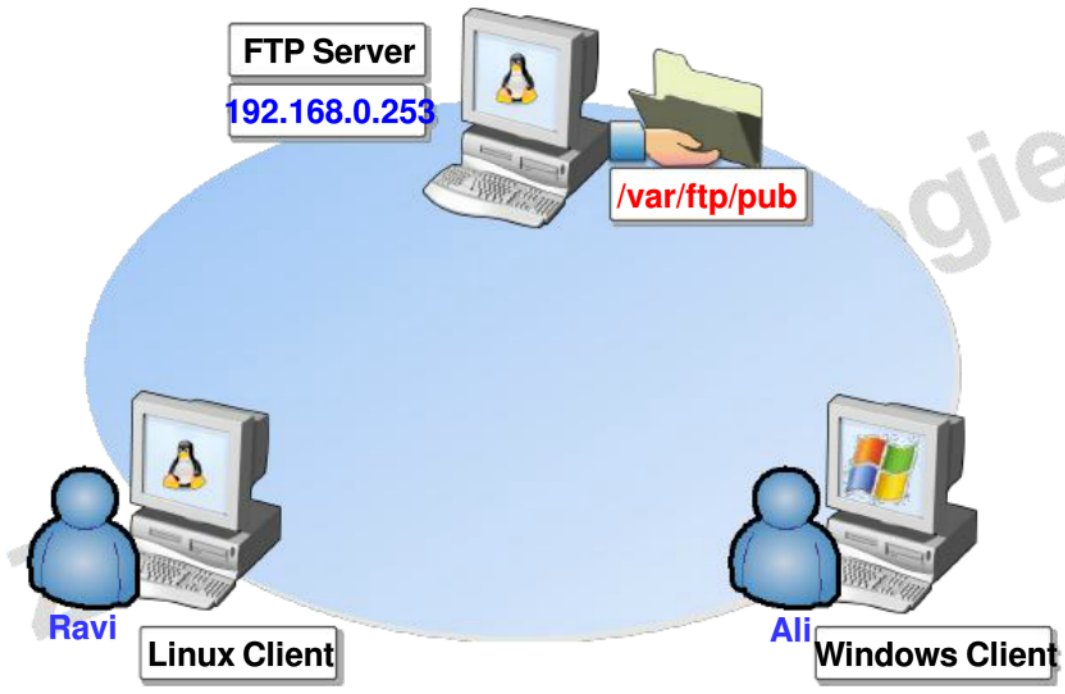
- **Installation packages**
  - vsftpd*
- **Configuration file**
  - /etc/vsftpd/vsftpd.conf
- **Port numbers**
  - 20 Data transfer
  - 21 Control Connection
- **Service /Daemon**
  - vsftpd

## Configuration – Anonymous Access






## Configuration – Local User Access



## FTP Server Configuration

Install the ftp package

[root@ftpserver ~]# **yum install vsftpd* -y**





## FTP Server Configuration – Anonymous Access

Edit the configuration file

[root@ftpserver ~]# **vi /etc/vsftpd/vsftpd.conf**

Change the below options

anonymous_enable=YES
local_enable=NO
anon_upload_enable=YES
ftpd_banner=Welcome to Linux FTP server

## FTP Server Configuration – Anonymous Access

Create a directory for uploading

[root@ftpserver ~]# **mkdir /var/ftp/upload**

Give full permission to the directory

[root@ftpserver ~]# **chmod 777 /var/ftp/upload**

Restart the ftp services

[root@ftpserver ~]# **service vsftpd restart**

[root@ftpserver ~}# **systemctl enable vsftpd**



## Accessing the FTP Server – Linux

```
[root@client1 ~]# ftp 192.168.0.253
Connected to 192.168.0.253.
220 (vsFTPd 3.0.2)
530 Please login with USER and PASS.
KERBEROS_V4 rejected as an
authentication type
Name (192.168.0.253:root): ftp
331 Please specify the password.
Password: enter
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp>
```

## Accessing the FTP Server – Linux

```
ftp> ls
227 Entering Passive Mode
(192,168,0,253,80,246)
150 Here comes the directory listing.
drwxr-xr-x      2 0        0          4096 Mar 01 06:42
          pub
drwxr-xrwx    2 0        0          4096 Mar 01 07:05
          upload
226 Directory send OK.
ftp>  bye
221 Goodbye.
[root@client1 ~]#
```



## FTP client side Commands

- ls — Lists the contents of the directory
- lcd — Change directory
- put — To upload a single file
- mput — To upload multiple files
- get — To download a single file
- mget — To download multiple files
- bye — To quit

## Accessing the FTP Server – Linux

Accessing FTP via Graphical User Interface

Open **'FireFox'** browser.
In the address box type **ftp://<FTP server name or IP>**





## Accessing the FTP Server – Windows

```
C:\Documents and Settings\Administrator>
Connected to 192.168.0.253.
220 (vsFTPd 3.0.2)
User (192.168.0.15:(none)): ftp  192.168.0.253
331 Please specify the password.
Password: ftp
230 Login successful.
ftp> ls
200 PORT command successful. Consider using
PASV.
150 Here comes the directory listing.
pub
upload
226 Directory send OK.
ftp: 50 bytes received in 0.02Seconds
3.13Kbytes/sec.
ftp>
```

## Accessing the FTP Server – Windows

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Accessing FTP via Graphical User Interface

Open **'Internet Explorer'** browser.

In the address box type **ftp://<FTP server name or IP>**





## FTP Server Configuration – Local User

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Edit the configuration file

[root@ftpserver ~]# **vi /etc/vsftpd/vsftpd.conf**

Change the below options

anonymous_enable=NO
local_enable=YES

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Create a user

[root@ftpserver ~]# **useradd ravi**

Assign the password

[root@ftpserver ~]# **passwd ravi**





FTP Server Configuration – Local User

Restart vsftpd service

[root@ftpserver ~]# **service vsftpd restart**

Zoom Technologies

LINUX

## Accessing the FTP Server – Linux

```
[root@client1 ~]# ftp 192.168.0.253
Connected to 192.168.0.253.
220 (vsFTPd 3.0.2)
530 Please login with USER and PASS.
KERBEROS_V4 rejected as an
authentication type          ravi
Name (192.168.0.253:root):
331 Please specify the password.
Password: ********
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp>
```



## Accessing the FTP Server – Linux

```
ftp> pwd
227 Entering Passive Mode
(192,168,0,253,80,246)
150 Here comes the directory listing.
/home/ravi
226 Directory send OK.
ftp> bye
 221 Goodbye.
 [root@client1 ~]#
```



LINUX


# YUM Configuration



Insert dvd and mount it on an existing dir

```
[root@comp1 ~]# mount /dev/dvd /media
```

Installing the FTP and Repositories Applications

```
[root@comp1 ~]# cd /media/Packages
[root@comp1 ~]# rpm -ivh vsftpd*
```

## Yum configuration

Copying dvd data into ftp directory

[root@comp1 ~]# **cp –rvp /media/* /var/ftp/pub**

Installing the FTP and Repositories Applications

[root@comp1 ~]# **cd /media/Packages**
[root@comp1 ~]# **rpm -ivh createrepo* deltarpm* --nodeps --force**



## Yum Configuration

To define the path to the repository

[root@comp1 ~]# **vi /etc/yum.repos.d/CentOS-Base.repo**

[core]
name=CentOS --base
**baseurl=ftp://<self system ip>/pub/Packages**
**enabled=1**
**:wq**
[root @comp1~]# **service vsftpd restart** or
[root @comp1~]# **systemctl vsftpd enable**

## Yum Configuration

- **On the local machine**
  - **Copy the all the packages into ftp directory.**
  - **Insert the OS DVD**
  - **Create the repository.**

Creating the repository

[root@comp1 ~]# **createrepo –g /media/Package/repodata/repomd.xml /var/ftp/pub/Packages**



## Client configuration

Edit Yum file by providing yum server ip and directory name

[root @yum ~ ]# **vi /etc/yum.repos.d/CentOS-Base.repo**

**baseurl= ftp://<yum server ip>/pub/Packages**
**Enabled=1**

[root @yum~ ]# **yum install evince* -y**


# Network File System (NFS)



- A network file system is any computer file system that supports sharing of files over a computer network.
- It is a centralized file storage system.
- The client cannot differentiate whether the file is stored locally or remotely.

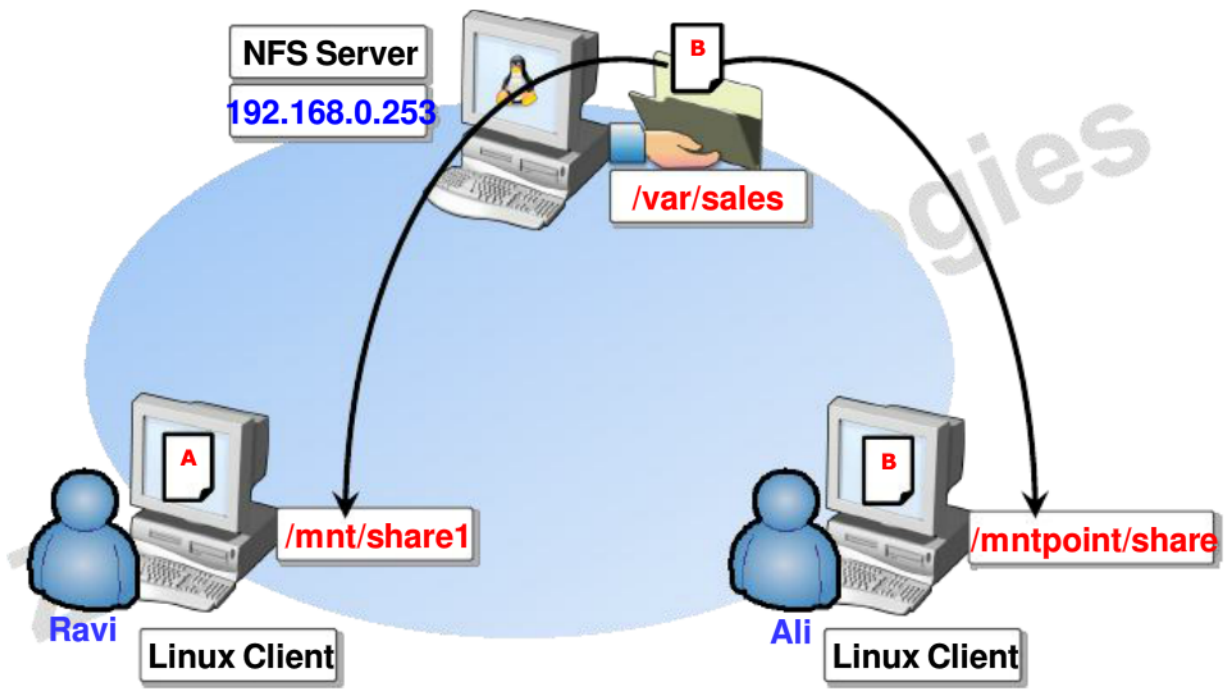
## Network File System (NFS)

- The NFS environment contains the following components :
- NFS server
  - A system that contains the file resources to be shared with other systems over the network.
- NFS client
  - A system that mounts the file resources shared over the network and presents the file resources as if they were local.





## How NFS works?



## NFS Requirements

- **Installation packages**
  - nfs*
  - rpcbind*
- **Port numbers**
  - 2049 nfs
  - 111 rpcbind
- **Configuration file**
  - /etc/exports
- **Service**
  - nfs
  - rpcbind
- **Daemon**
  - nfsd
  - mountd
  - statd
  - lockd





## NFS Server Configuration

Install the NFS packages

[root@nfsserver ~]# **yum install nfs* rpcbind* -y**

## NFS Server Configuration

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Edit the NFS configuration file

[root@nfsserver ~]# **vi /etc/exports**

```
/project                192.168.0.0/255.255.255.0(rw,sync)
```

Restart the NFS service

[root@nfsserver ~]# **service nfs restart**
[root@nfsserver~]# **systemctl enable nfs**



## NFS Client Configuration

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To find NFS share directory

[root@client1 ~]# **showmount –e 192.168.0.253**

Mounting the share directory of NFS server

[root@client1 ~]# **mount 192.168.0.253:/project /mnt**

Checking the mount point

[root@client1 ~]# **mount**

Enter into server share mount directory

[root@client1 ~]# **cd /mnt**

Try to add data as a user

[root@client1 ~]# **mkdir client data{1..25}**

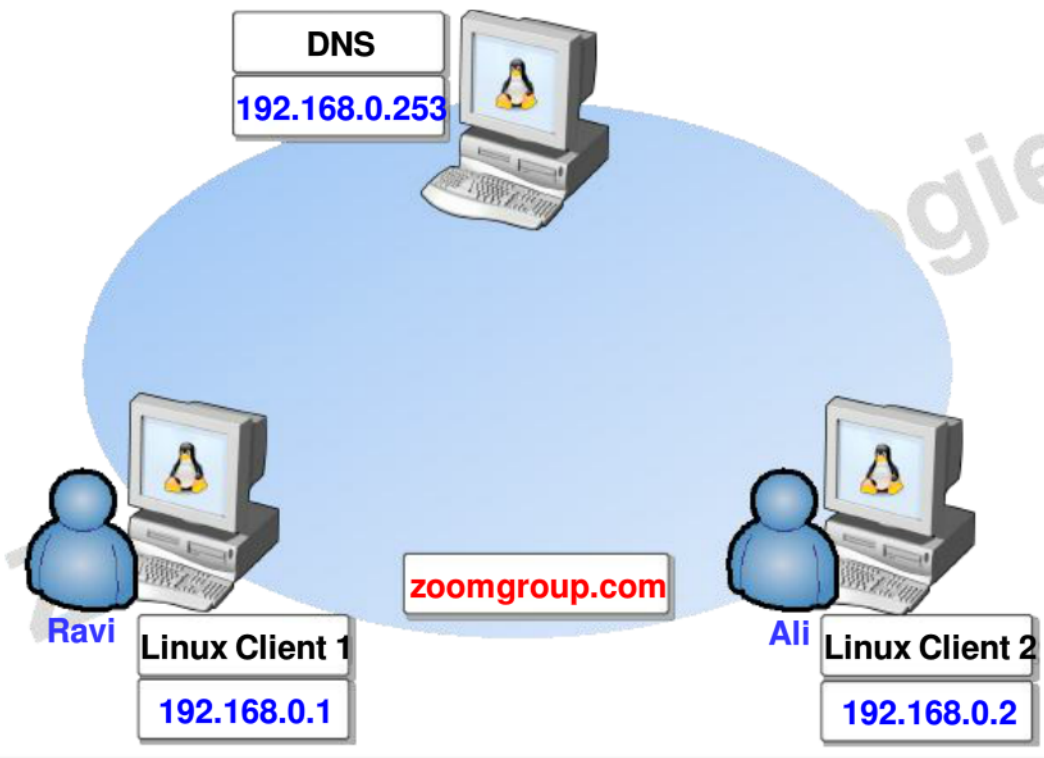
Check the user data in NFS server

[root@nfsserver ~]# **ls /project**

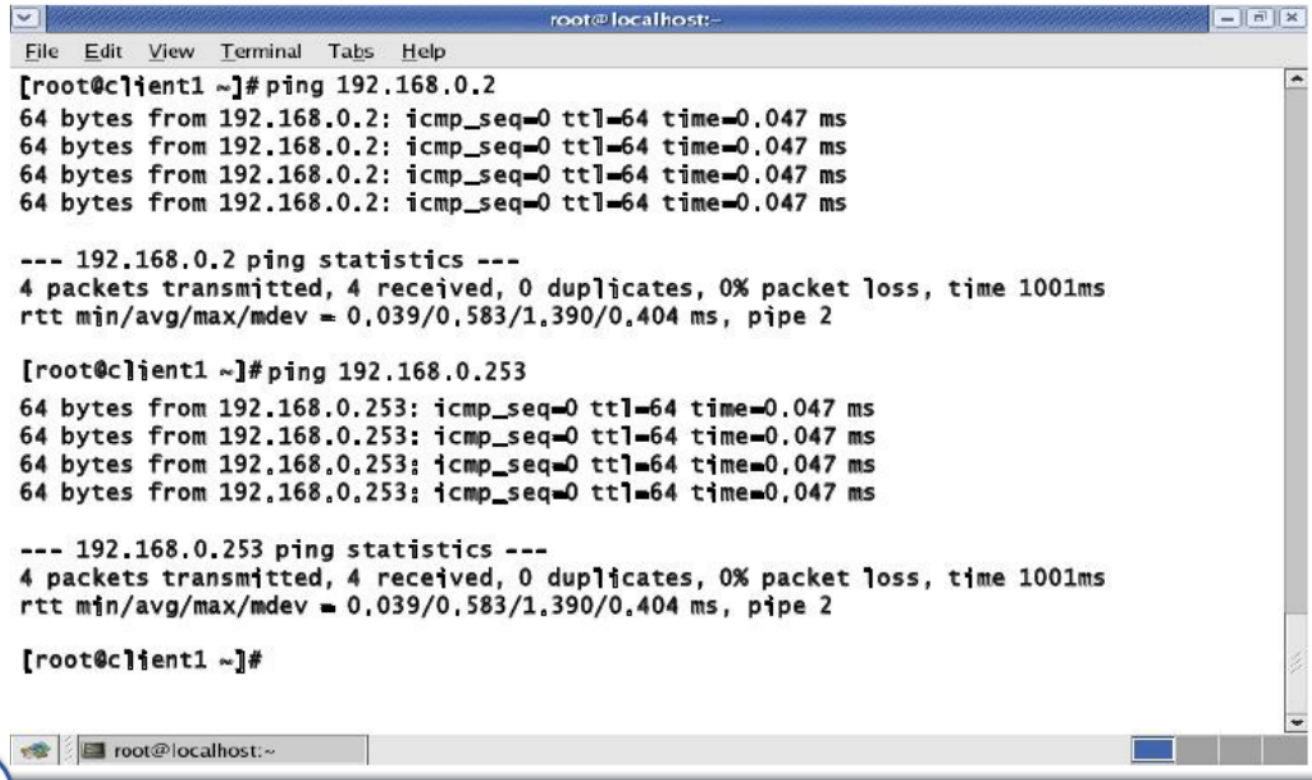



# Domain Name System (DNS)

## Hostname Resolution



## Hostname Resolution

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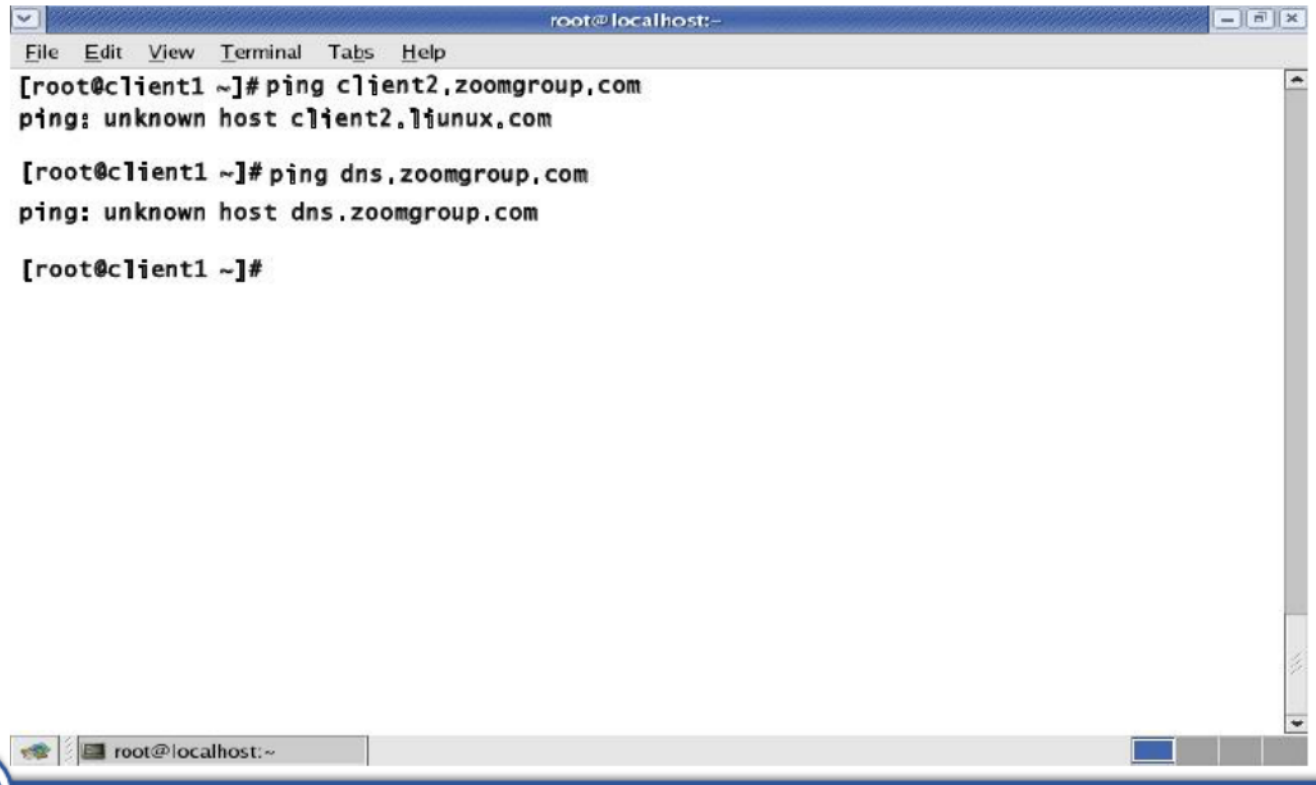
## Hostname Resolution

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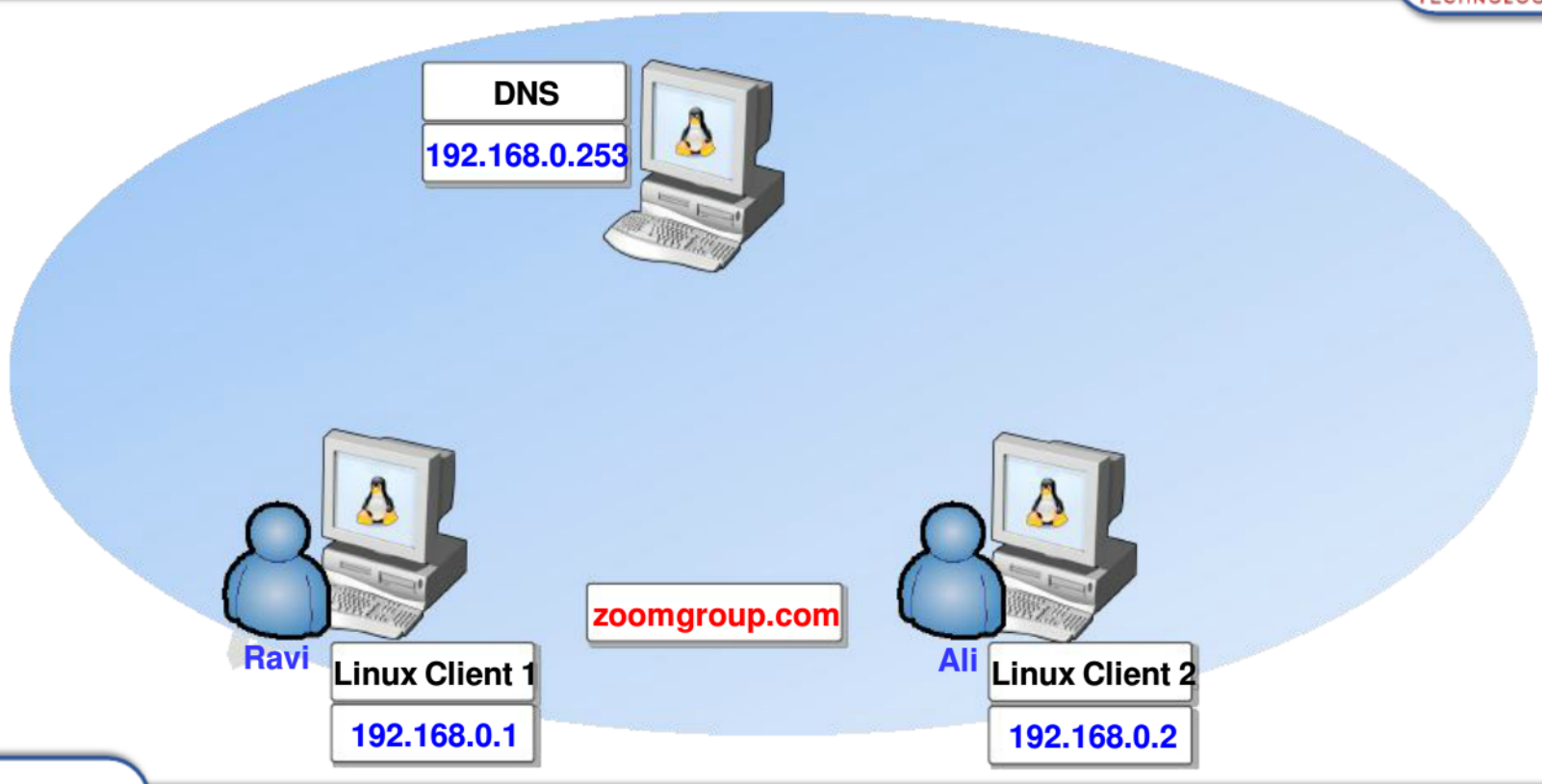
## Host File

- The host file provides resolution of hostnames to IP addresses.
- It can only resolve names provide in the local host file.
- It cannot be used as a centralized database.
- The hostname and IP address mapping is given in /etc/hosts





## Hostname Resolution



## Host File Configuration

Edit the configuration host file

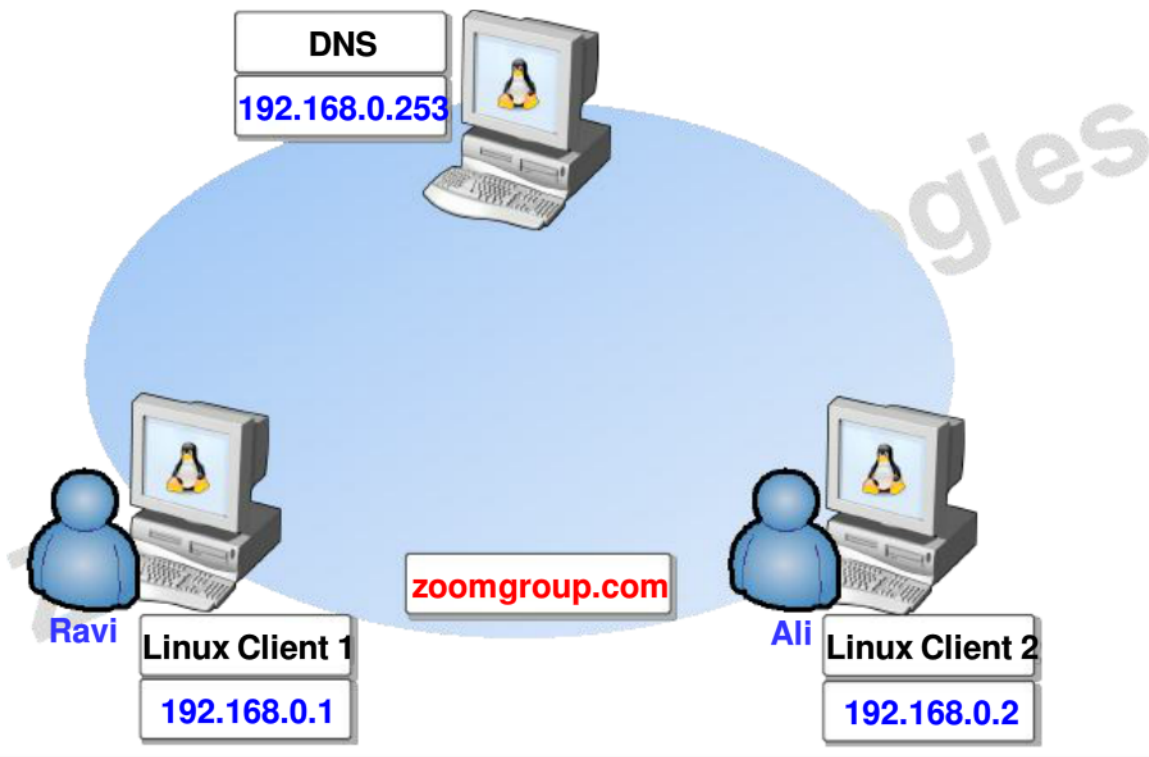
[root@dns ~]# **vi /etc/hosts**

**Add the entries required**

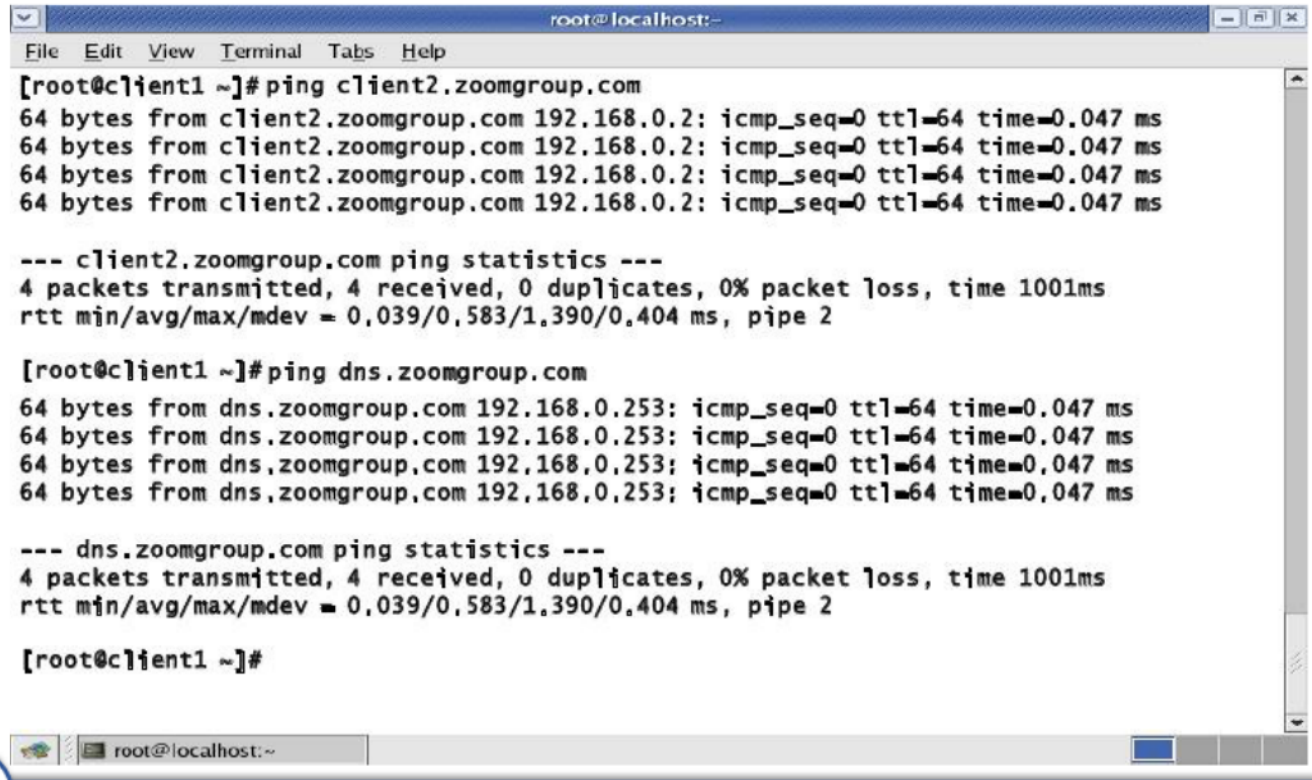
| | | |
|---|---|---|
| **127.0.0.1** | **localhost.localdomain** | **localhost** |
| **192.168.0.253** | **dns.zoomgroup.com** | **dns** |
| **192.168.0.1** | **client1.zoomgroup.com** | **client1** |
| **192.168.0.2** | **client2.zoomgroup.com** | **client2** |



## Hostname Resolution



## Hostname Resolution

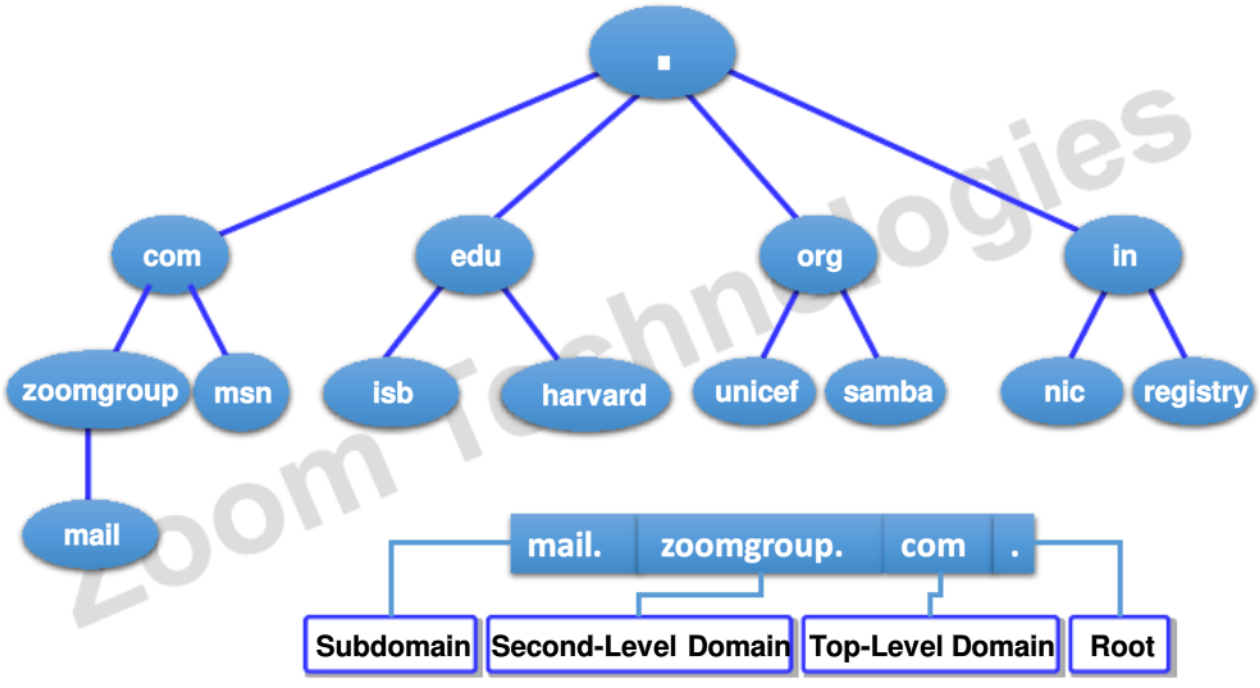





## Domain Name System (DNS)

- The Domain Name System (DNS) is a hierarchical naming system where each level of name is separated by a “.”.
- It resolves user friendly domain names into computer friendly IP addresses.
- It also resolves IP addresses into domain names.
- It provides a centralized database for resolution.

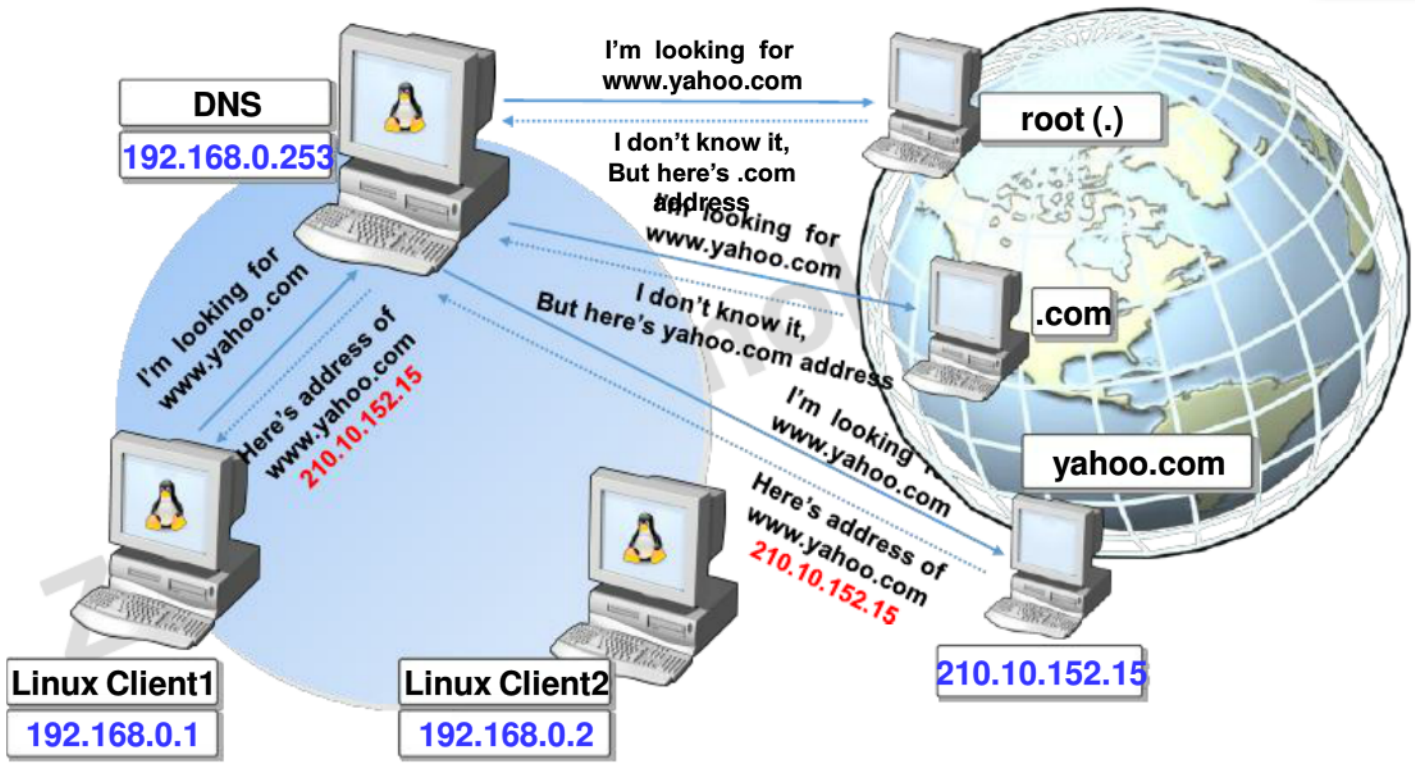
## DNS Namespace








## How DNS works ?



## Zone

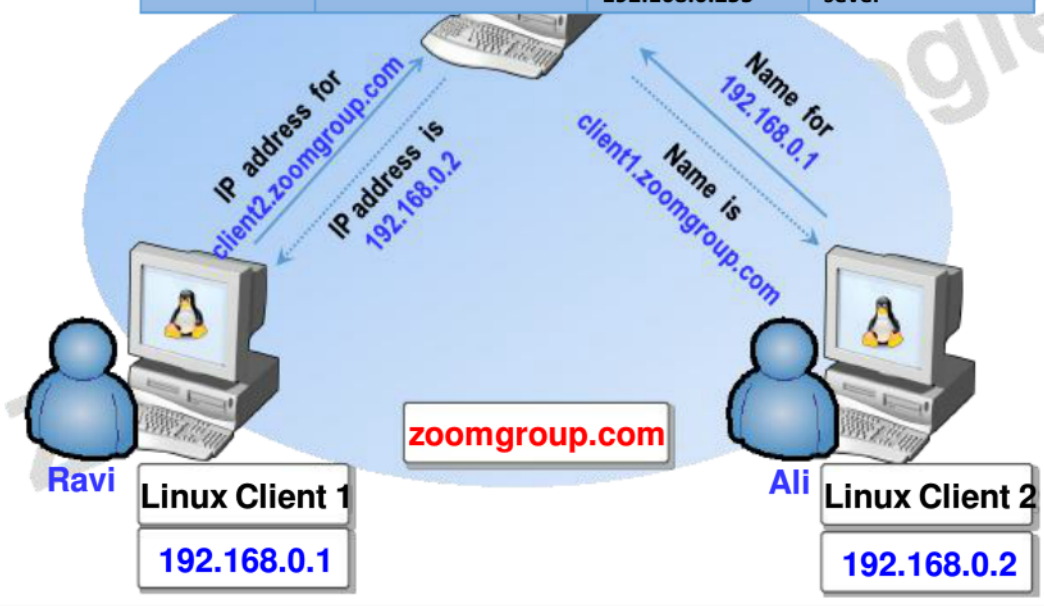
- Zone is a storage database which contains all the records.
- There are two zones:
- **Forward Lookup Zone**
  - Used for resolving hostnames to IP address.
  - It maintains host to IP address mapping information.
- **Reverse Lookup Zone**
  - Used for resolving IP address to hostnames.
  - It maintains IP address to hostname mapping information.





## How DNS Resoluti

| | | | |
|---|---|---|---|
| Forward zone | zoomgroup.com | client1 | 192.168.0.1 |
| | | client2 | 192.168.0.2 |
| | | sever | 192.168.0.253 |
| Reverse zone | 0.168.192.in-addr.arpa | 192.168.0.1 | client1 |
| | | 192.168.0.2 | client2 |
| | | 192.168.0.253 | sever |



## Records

- **SOA Record**
  - Start of Authority
  - It is the first record in any zone file.
- **NS Record**
  - Name Server
  - Identifies the DNS server for each zone.
- **A Record**
  - Address
  - Maps a hostname to an IP address.





Records

- **CNAME Record**
  - Canonical Name (Alias)
  - Maps an alias name to a hostname.
- **PTR Record**
  - Pointer
  - Maps an IP address to a hostname.
- **MX Record**
  - Mail Exchange
  - Maps a domain name to a mail server.

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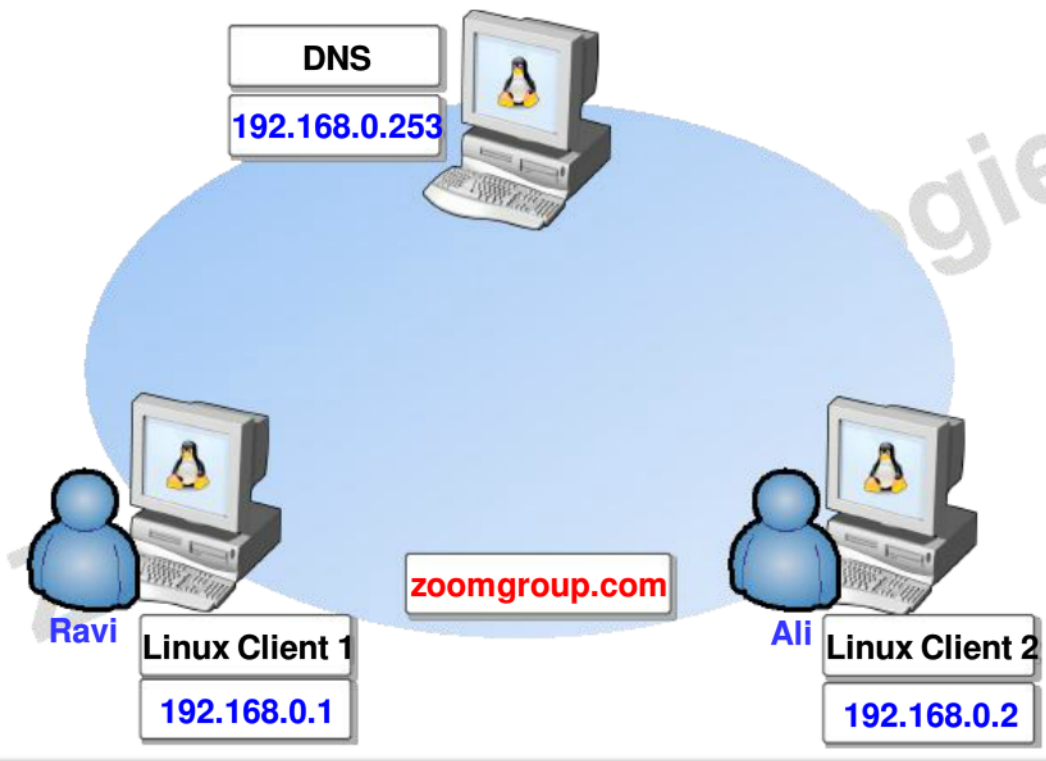
## DNS Requirements

- **Packages**
  - bind
- **Port number**
  - 53 DNS
- **Configuration files**
  - /etc/named.conf
  - /etc/named.rfc1912.zones
- **Database Directory**
  - /var/named
- **Service/Daemon**
  - named





## DNS Configuration



## Installing DNS

Installing DNS

[root@dns ~]# **yum install bind* -y**





## Configuration of named.conf

Edit the configuration file

[root@dns ~]# **vi /etc/named.conf**

**Add the following options**

**listen-on port 53 { 127.0.0.1 ; 192.168.0.252; };**

**allow-query { localhost; 192.168.0.0/24; };**

## Configuration of named.rfc1912.zones

Edit the configuration file

[root@dns ~]# **vi /etc/named.rfc1912.zones**

**To add the options**

```
zone "zoomgroup.com"  IN {
        type master;
        file “zoom.for";
  };
  zone "0.168.192.in-addr.arpa" IN {
        type master;
        file “zoom.rev";
  };
```



## Configuration – Forward Lookup Zone

Copy the forward lookup zone file

[root@dns ~]# **cd /var/named**

[root@dns named]# **cp -p named.localhost zoom.for**

**Note:** The file has to be copied with the permission

Edit the file zoom.for

[root@dns named]# **vi zoom.for**

## Configuration – Forward Lookup Zone

To add the options

```
$TTL    86400
@       IN      SOA     dns.zoomgroup.com.
root.zoomgroup.com.(
                                0       ; serial (d. adams)
                                1D      ; refresh
                                3H      ; retry
                                1W      ; expire
                                1D)     ; minimum

        IN      NS      dns.zoomgroup.com.
dns     IN      A       192.168.0.252
client1 IN      A       192.168.0.1
client2 IN      A       192.168.0.2
www     IN      CNAME   client1
```



## Configuration – Reverse Lookup Zone

Copy the reverse lookup zone file

```
[root@dns ~]#  cd /var/named
[root@dns named]#  cp  -p  named.loopback  zoom.rev
```

**Note:** The file has to be copied with the permission

Edit the file zoom.rev

```
[root@dns named]#  vi  zoom.rev
```

## Configuration – Reverse Lookup Zone

To add the options

```
$TTL    86400
@       IN      SOA     dns.zoomgroup.com.
root.zoomgroup.com.(
                                0       ; Serial
                             3600       ; Refresh
                             10800      ; Retry
                             3600000    ; Expire
                             86400)     ; Minimum

        IN      NS      dns.zoomgroup.com.
252     IN      PTR     dns.
1       IN      PTR     client1.
2       IN      PTR     client2.
```



## Configuration of DNS Server IP Address

Edit the configuration file

[root@dns ~]# **vi /etc/resolv.conf**

**Add the following options**

**nameserver 192.168.0.253**

## Restart the Services

Restart the DNS service temporary

[root@dns ~]# **service named restart**

Restart the DNS service permanent

[root@dns ~]# **systemctl enable named**



## Checking the Configuration

To check the main configuration file

[root@dns ~]# **named-checkconf /etc/named.conf**

To check the forward lookup zone file

[root@dns ~]# **named-checkzone zoomgroup.com /var/named/zoom.for**

To check the reverse lookup zone file

[root@dns ~]# **named-checkzone zoomgroup.com /var/named/zoom.rev**

## Checking the Configuration

Checking forward lookup

[root@dns ~]# **dig client1.zoomgroup.com**

[root@dns ~]# **dig client2.zoomgroup.com**

Checking reverse lookup

[root@dns ~]# **dig -x 192.168.0.1**

[root@dns ~]# **dig -x 192.168.0.2**

Mount the remote file-system

[root@dns ~]# **ping client1.zoomgroup.com**

[root@dns ~]# **ping client2.zoomgroup.com**



## Configuration of DNS Server IP Address

Edit the configuration file

[root@client1 ~]# **vi /etc/resolv.conf**

**Add the following options**

**nameserver** 192.168.0.252

Checking forward lookup

[root@client1 ~]# **dig dns.zoomgroup.com**

[root@client1 ~]# **dig client2.zoomgroup.com**

Checking reverse lookup

[root@client1 ~]# **dig -x 192.168.0.2**

[root@client1 ~]# **dig -x 192.168.0.252**

Mount the remote file-system

[root@client1 ~]# **ping dns.zoomgroup.com**

[root@client1 ~]# **ping client2.zoomgroup.com**



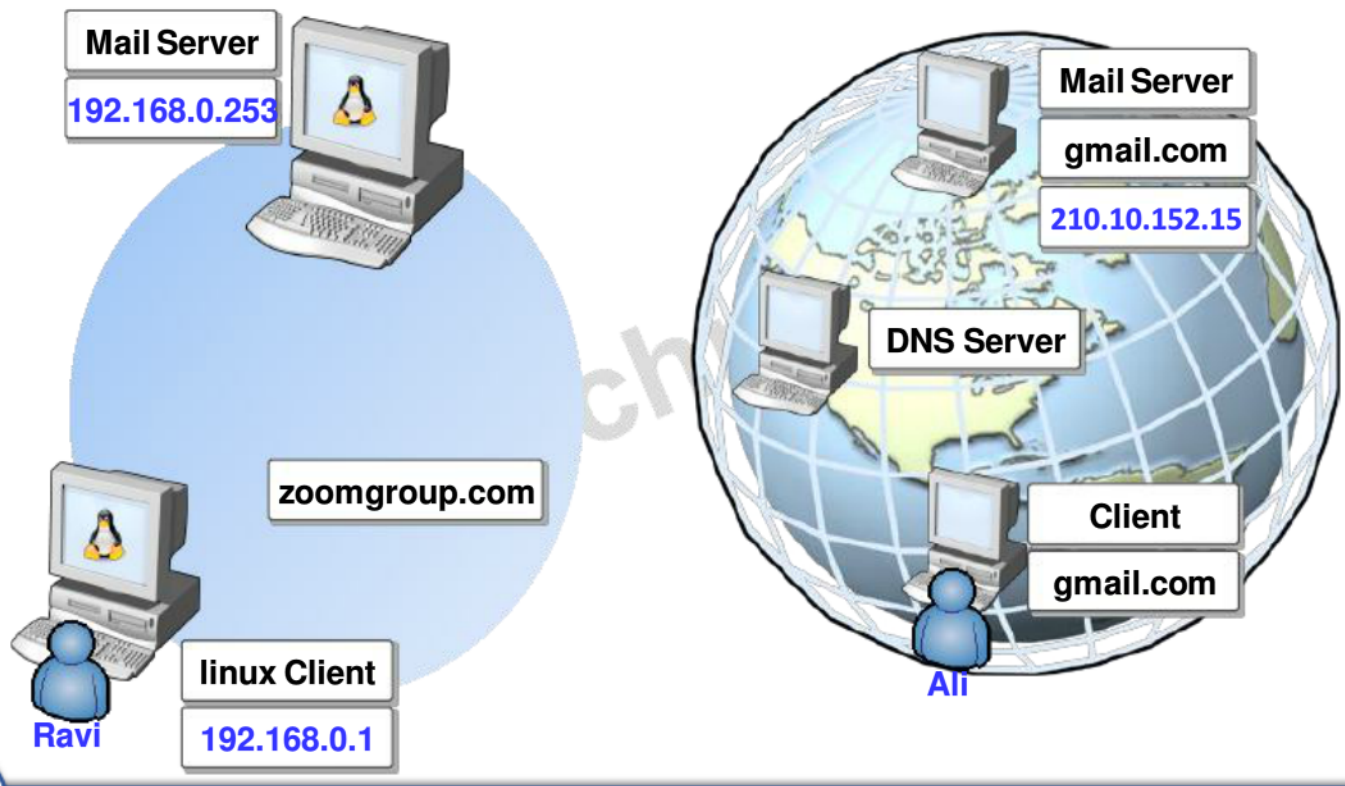
## Unix / linux Based Mail Servers

- Sendmail
- Postfix
- Qmail
- Smail
- Exim
- Zimbra

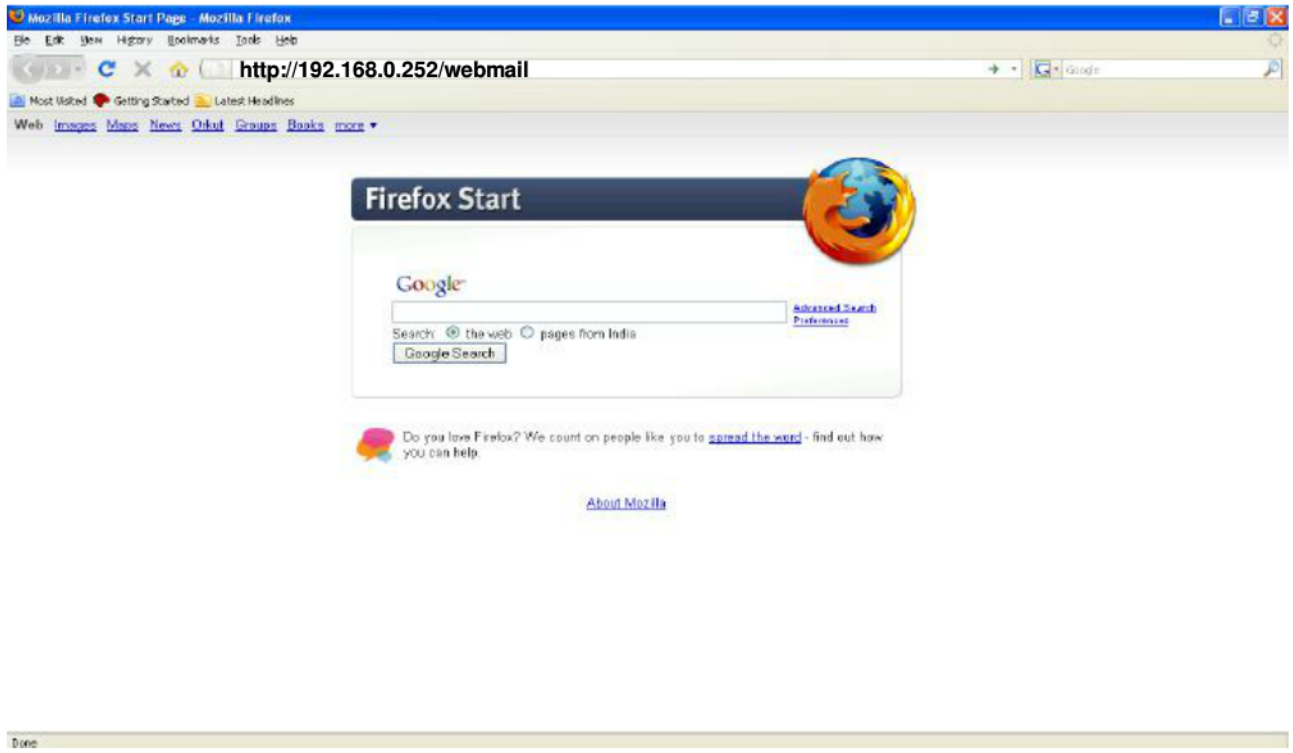




## How Mail Server Works?

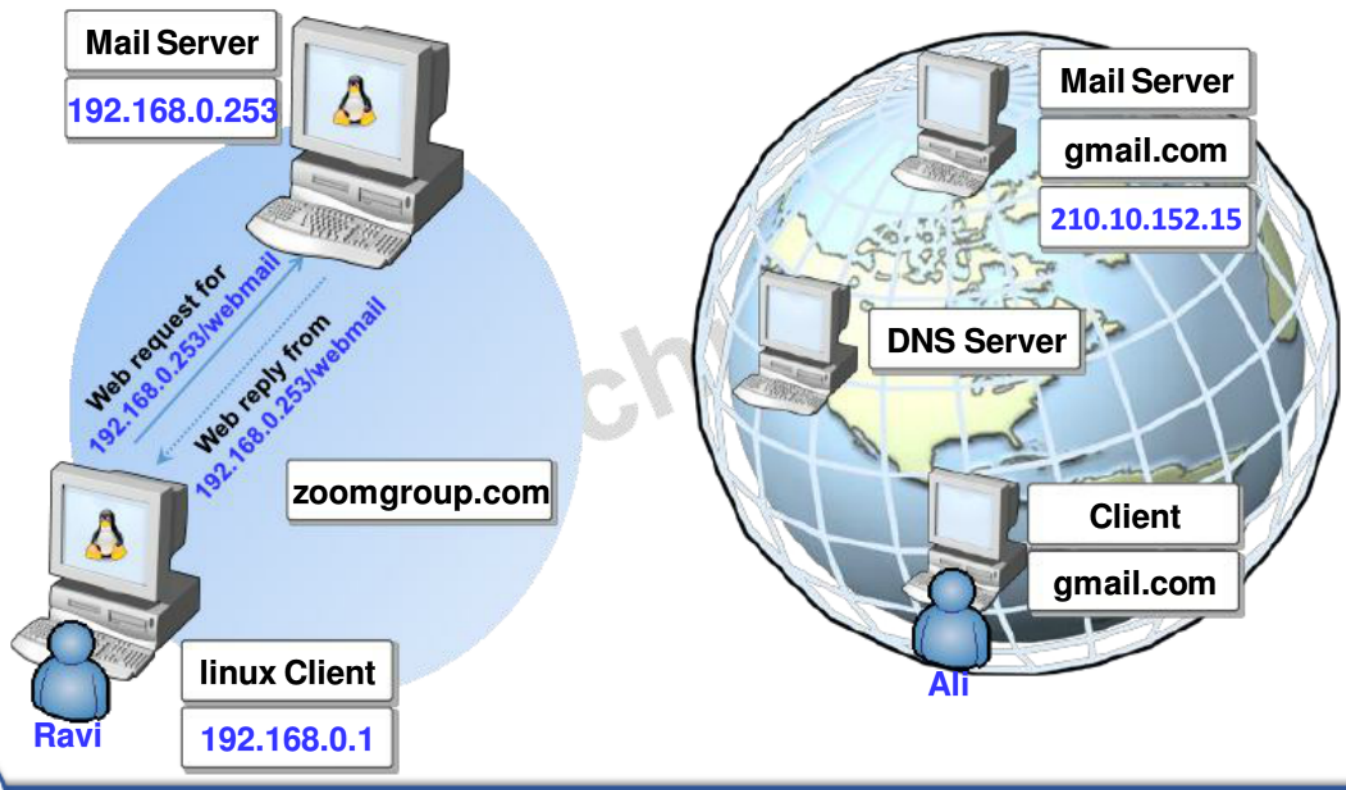


## How Mail Server Works?






## How Mail Server Works?



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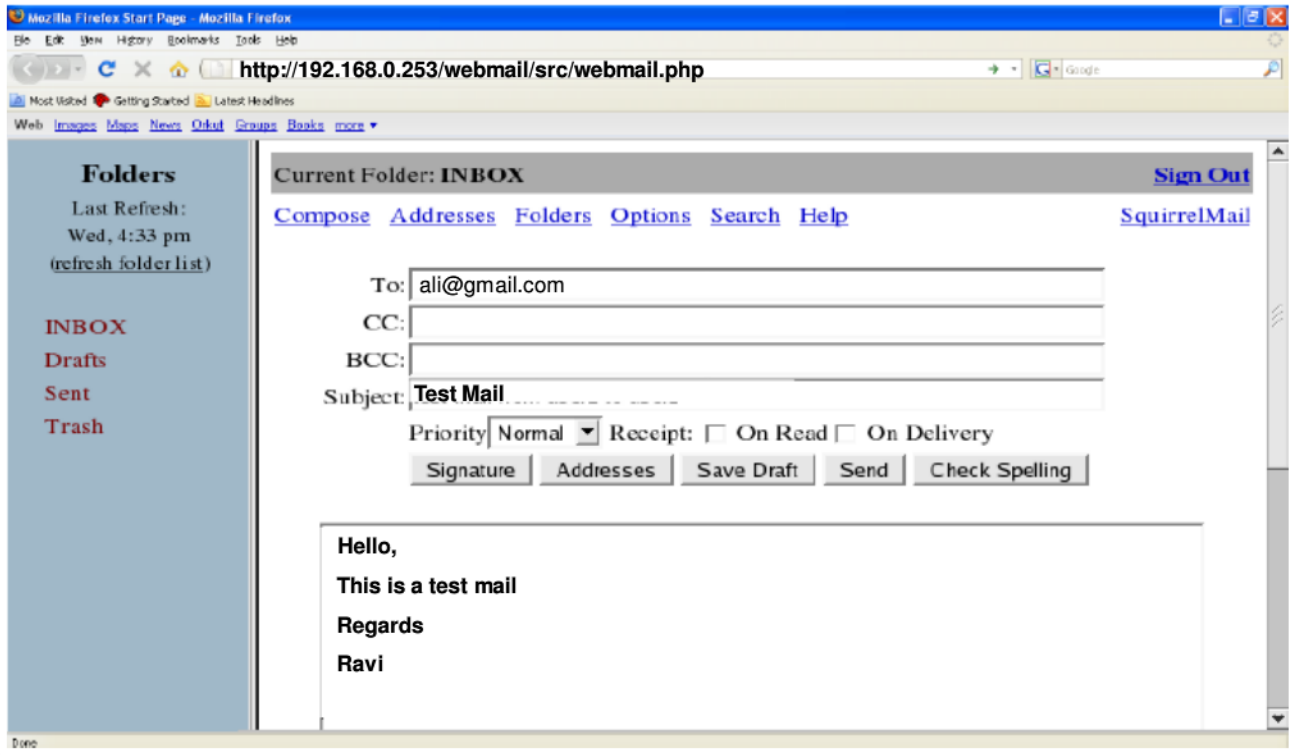
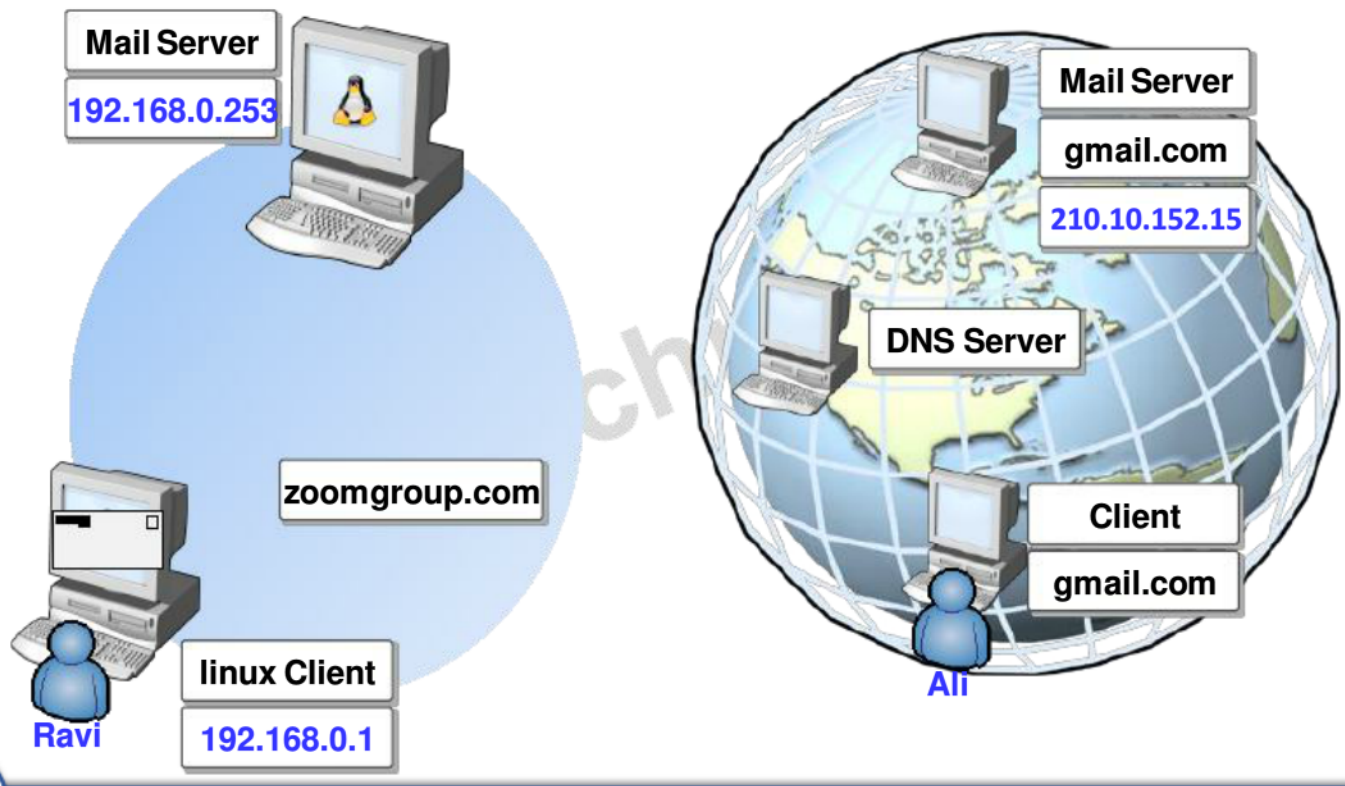
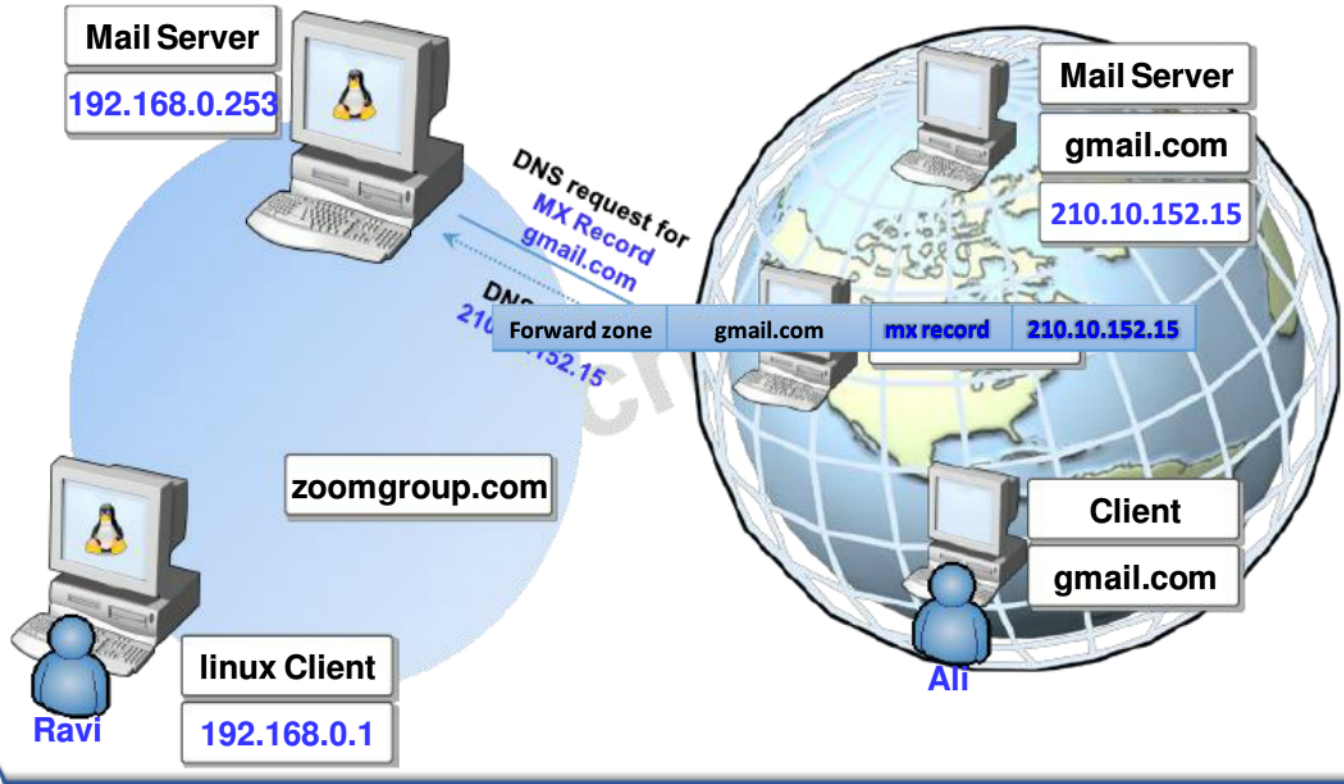





## How Mail Server Works?

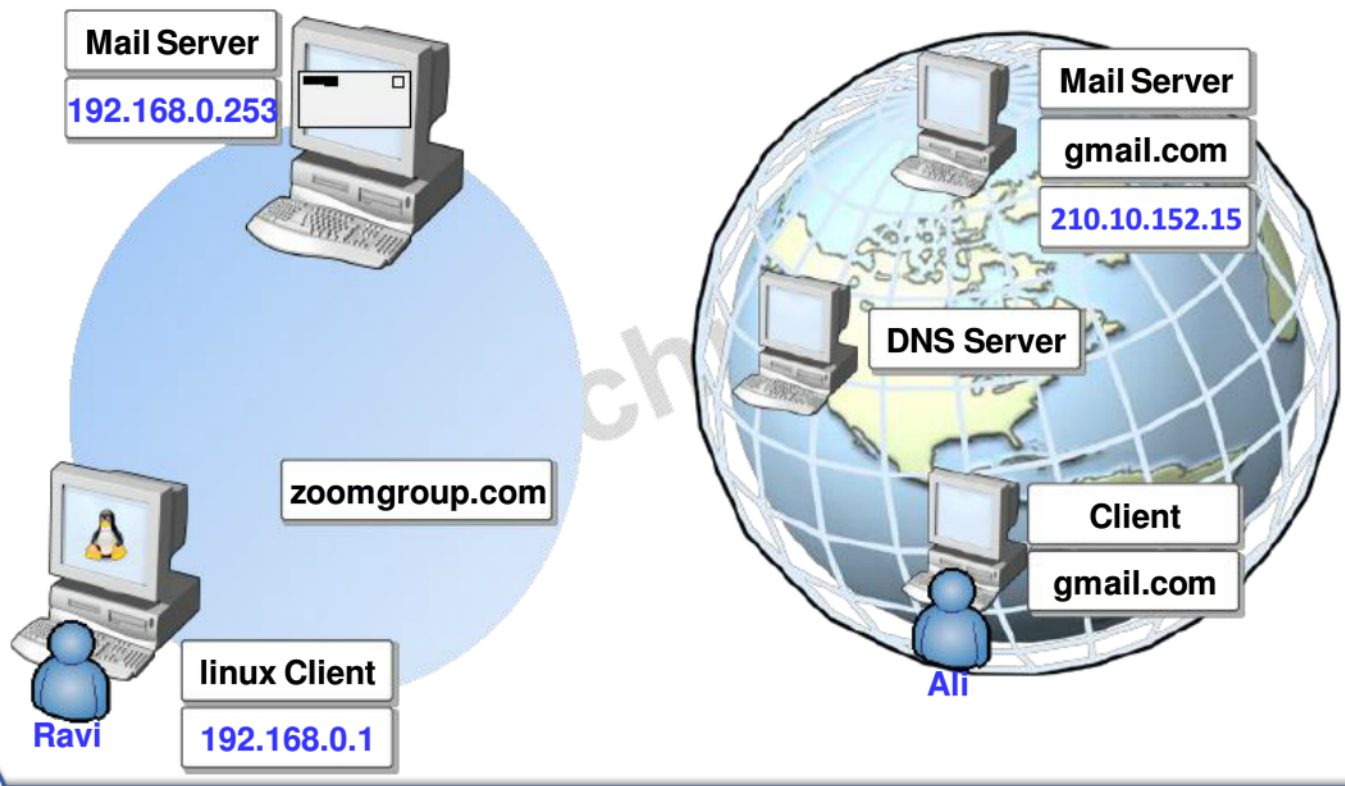


## How Mail Server Works?



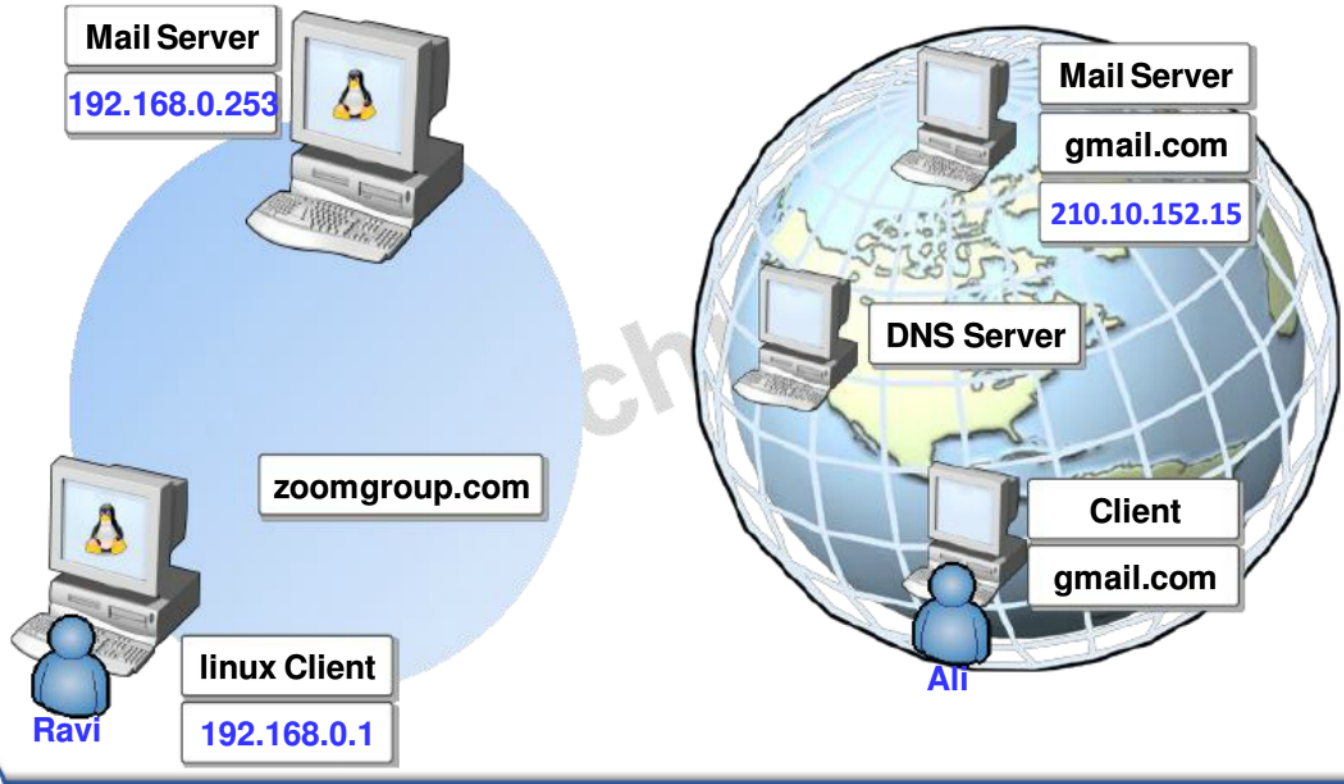


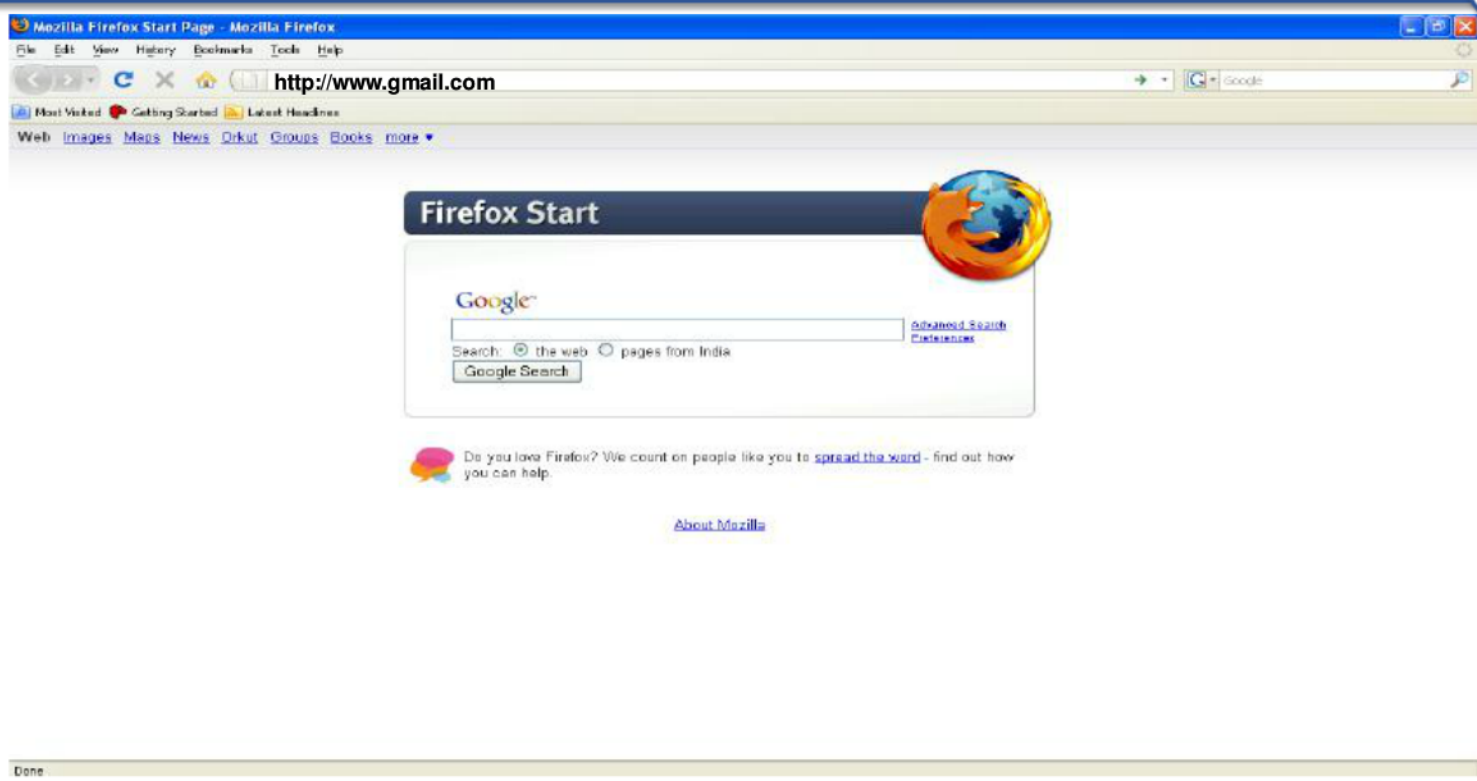

## How Mail Server Works?



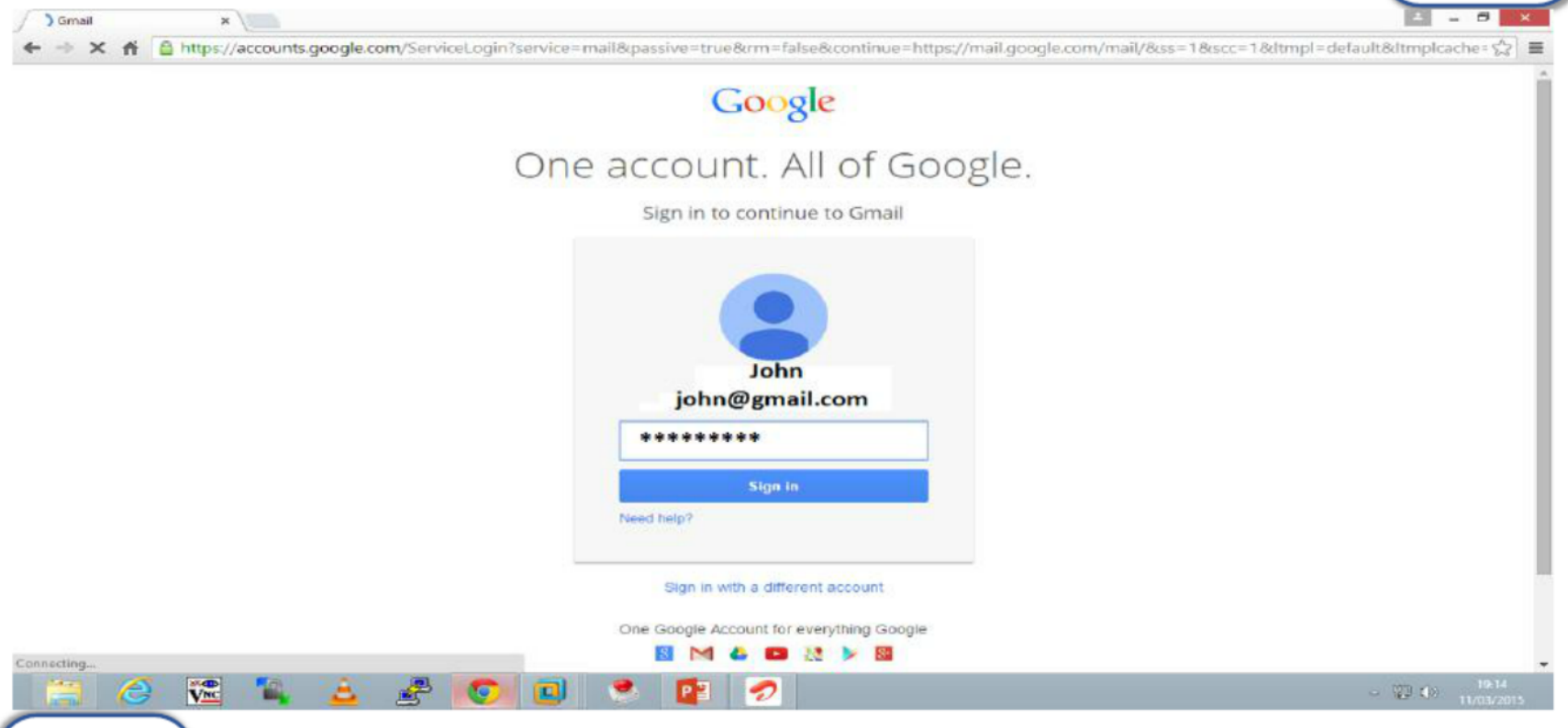

LINUX

## How Mail Server Works?



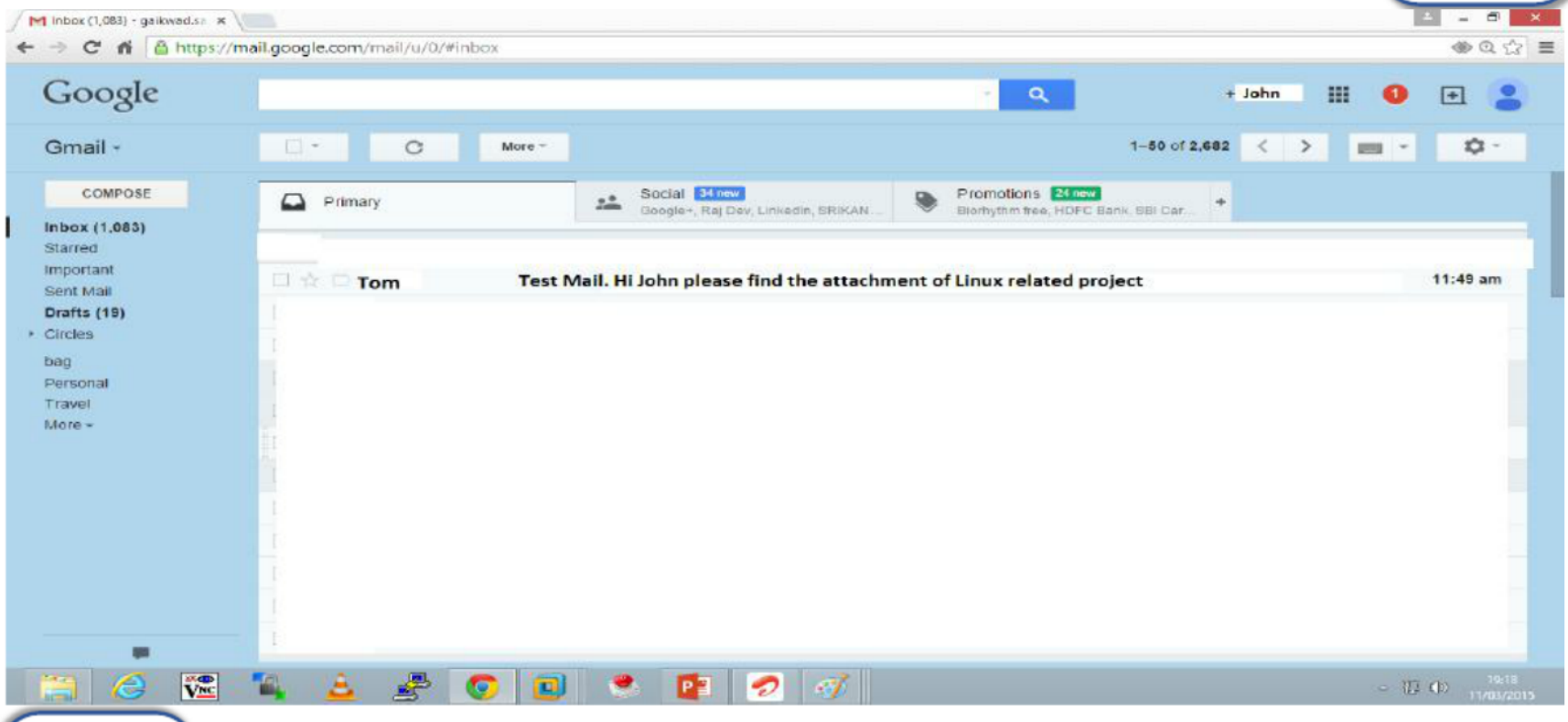



## How Mail Server Works?






## How Mail Server Works?




LINUX

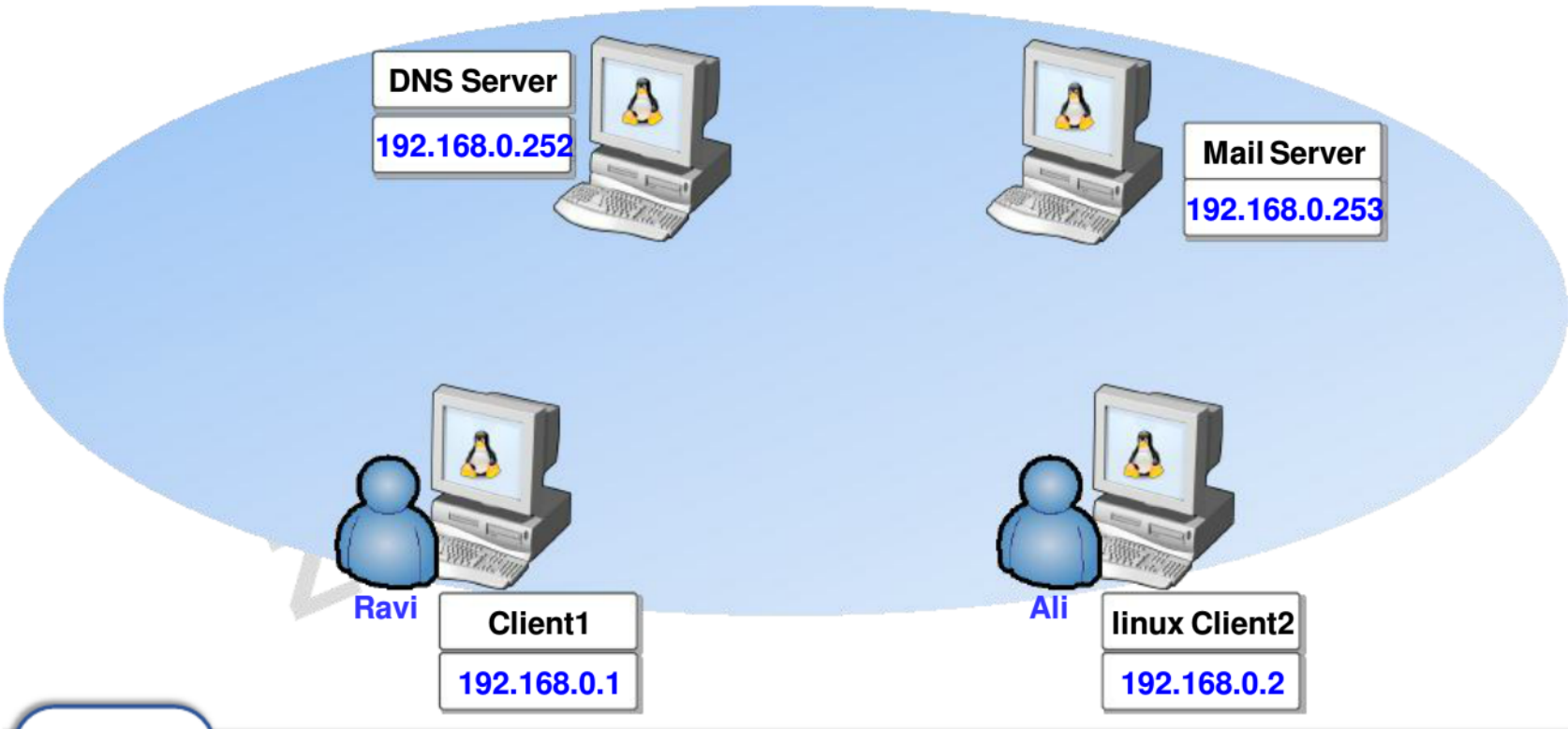
## Postfix Requirements

- **Packages**
  - postfix*.rpm
- **Port Numbers**
  - 25 Simple Mail Transfer Protocol (SMTP)
  - 110 Post Office Protocol v3 (POP3)
  - 143 Interim Mail Access Protocol (IMAP)
- **Configuration File**
  - /etc/postfix/main.cf
- **Service / Daemon**
  - postfix





## Mail Server Configuration



## Mail Server Configuration

Install the Postfix packages

[root@mailserver ~]# **yum install postfix* -y**





## Postfix Server Configuration

Edit the configuration file

[root@mailserver ~]# **vi /etc/postfix/main.cf**

Change the below options

83: remove # from beginning of line and add

**mail.zoomgroup.com**

75: remove # from beginning of line and add

**zoomgroup.com**

**:wq**

## Postfix Server Configuration

To create mail users

```
[root@mailserver ~]# useradd ravi
[root@mailserver ~]# useradd ali
```

To restart the mail services

```
[root@mailserver ~]# service postfix restart
```

To restart the mail services

```
[root@mailserver ~]# systemctl enable postfix
```



## Testing the Mail Server

To send the mail from one user to another user

```
[root@mailserver ~]# mail ravi
        Subject: Test message
        This is a test message
        .
        Cc:
[root@mailserver ~]#
```

## Testing the Mail Server

ZOOM TECHNOLOGIES

To check if the mail has been received

```
[root@mailserver ~]# su - ravi
[ravi@mailserver ~]$ mail
```





## DNS Server Configuration

ZOOM TECHNOLOGIES

Install the DNS packages

```
[root@dns ~]# yum install bind* -y
```

Zoom Technologies

Edit the configuration file

[root@dns ~]# **vi /etc/named.conf**

**Change the below options**

```
listen-on port 53 { 127.0.0.0;  192.168.0.252;  };

allow-query { localhost;  192.168.0.0/24;  };
```





Edit the configuration file

[root@dns ~]# **vi /etc/named.rfc1912.zones**

**Add the lines at the bottom of the file**

```
zone "zoomgroup.com"  IN {
        type master;
        file “zoom.for";
};
```

Copy with permissions the forward lookup zone file for editing

[root@dns ~]# **cd /var/named**

[root@dns named]# **cp -p named.localhost zoom.for**







Edit the configuration file

[root@dns named]# **vi zoom.for**

Make the following entries

```
$TTL 86400
@               IN      SOA     @                       root. (
                                                0       ; serial (d. adams)
                                                1D      ; refresh
                                                3H      ; retry
                                                1W      ; expiry
                                                1D )    ; minimum
                IN  NS              @
                IN  A               192.168.0.252
mailserver      IN  A               192.168.0.253
@               IN  MX  5           mailserver
mail            CNAME               mailserver
```

Configure primary DNS server address

[root@dns ~]# **vi /etc/resolv.conf**

**Add the DNS server IP address**

**nameserver 192.168.0.253**



Restart the DNS service

[root@dns ~]# **service named restart**

Restart the DNS service permanent

[root@dns ~]# **systemctl enable named**

To check the resolution

[root@dns ~]# **dig –t mx zoomgroup.com**


# Squirrel Mail



- **Packages**
  - squirrelmail*.rpm
  - dovecot-*.rpm
  - curl*
  - php-5*
  - perl-5*
  - httpd*
  - mod_ssl*
  - hunspell-en*
  - tmpwatch*

Install the squirrelmail requirement packages

```
[root@mailserver ~]# yum install mod_ssl* perl* curl* php*
hunspell-en* dovecot* httpd* postfix* tmpwatch* -y
```

Download and Squirrel mail package

```
[root@mailserver ~]# ftp 192.168.0.250
```





Enter into Downloads directory

```
[root@mailserver ~]# cd /root/Downloads
```

Install the squirrelmail package

```
[root@mailserver ~]#
[root@mailserver ~]# rpm –ivh squirrelmail* --force
```

Edit the configuration file

[root@mailserver ~]# **vi /etc/dovecot/conf.d/10-auth.conf**

Change the below options

10: disable_plaintext_auth = **no**
100: auth_mechanisms = plain **login**
:wq!





Edit the configuration file

[root@mailserver ~]# **vi /etc/dovecot/conf.d/10-mail.conf**

Change the below options

25: disable_plaintext_auth = /var/**spool**/mail
119: mail_access_group = **mail**
:wq!

Copy the squirrelmail directory data in apache directory

```
[root@mailserver ~]#  cp –rv /usr/share/squirrelmail/*
                      /var/www/html
```

Start the postfix service

```
[root@mailserver ~]#  service postfix restart
```





Start the dovecot restart

```
[root@mailserver ~]#  service dovecot restart
```

Start the httpd service

```
[root@mailserver ~]#  service httpd restart
```

To find send mail on GUI mode

[root@dns ~]# **firefox &**

**http://mail.zoomgroup.com**



## Unix / Linux Based Web Servers

- **TUX –** In-Kernel web server that supports only text.
- **Apache –** The most popular web server.
- **AOL –** American Online free web server.
- **Sun One –** Web server from SUN previously called as iPlanet

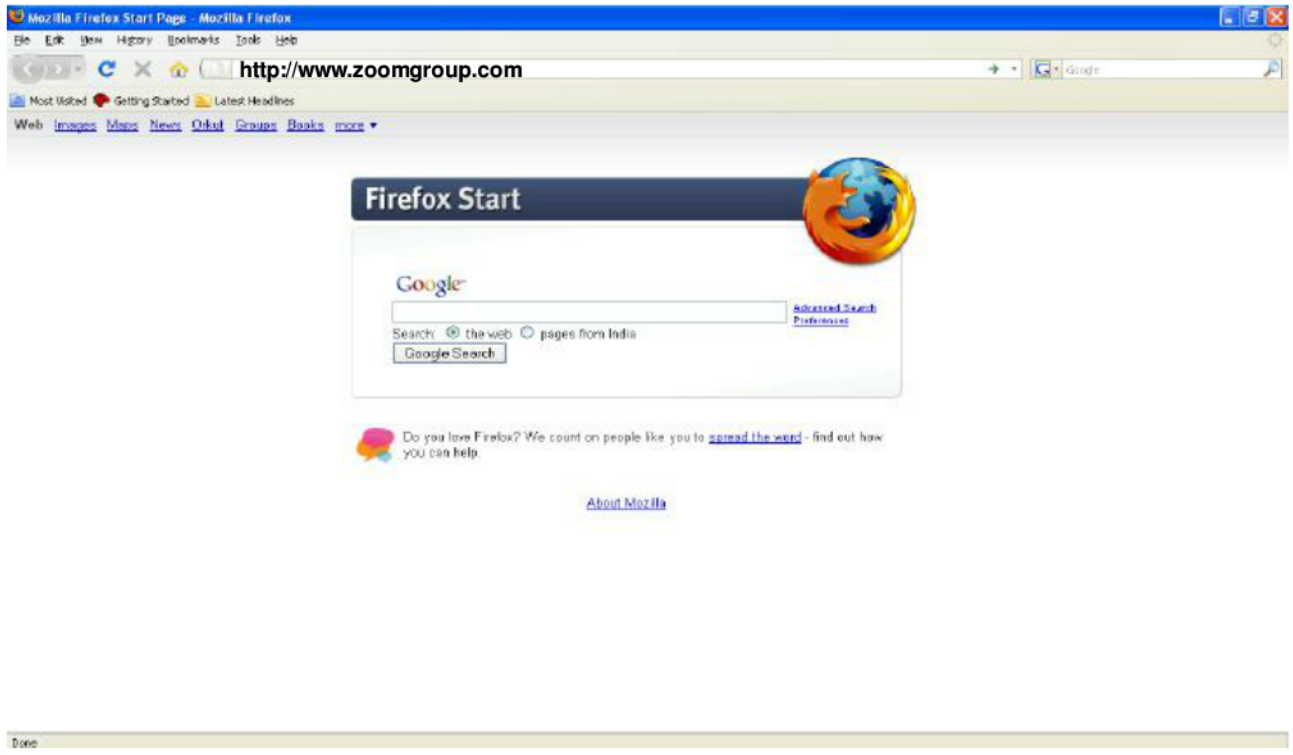




## Apache

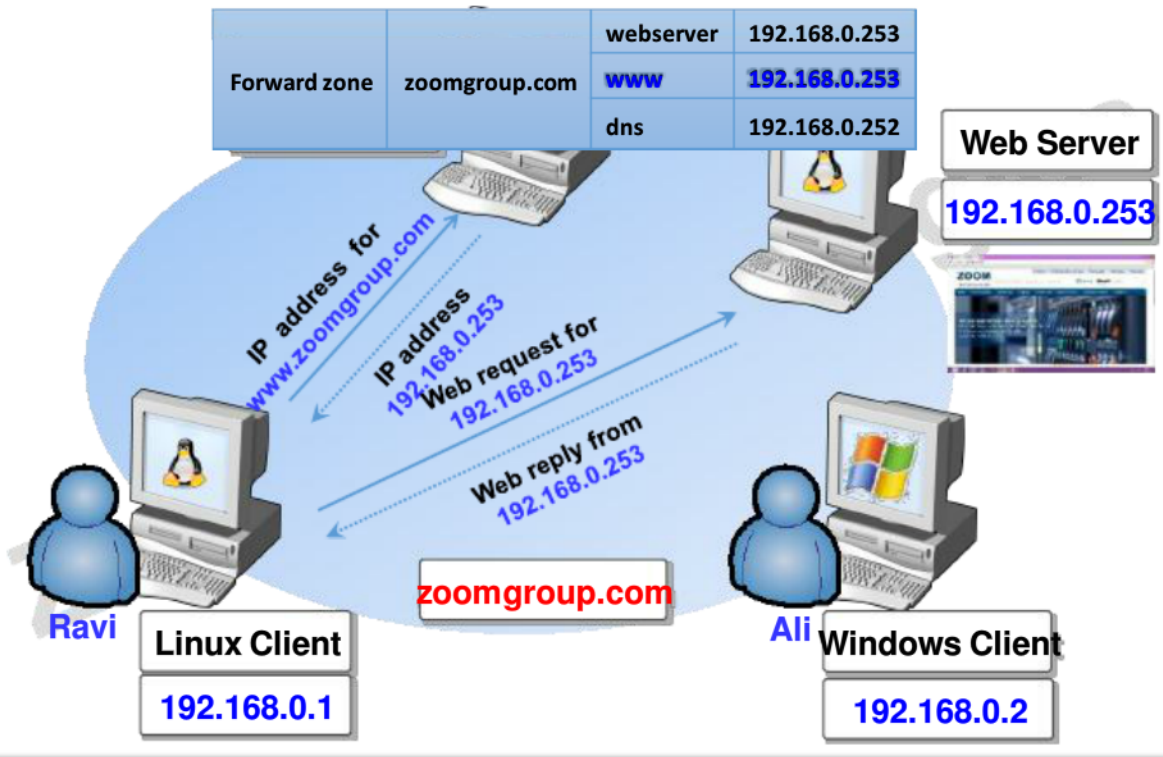
- Apache is a free and open source software.
- The application is available for a wide variety of operating systems, including Unix, Linux and Windows.
- The majority of all web servers using Apache are Linux web servers.

## Web Browsing

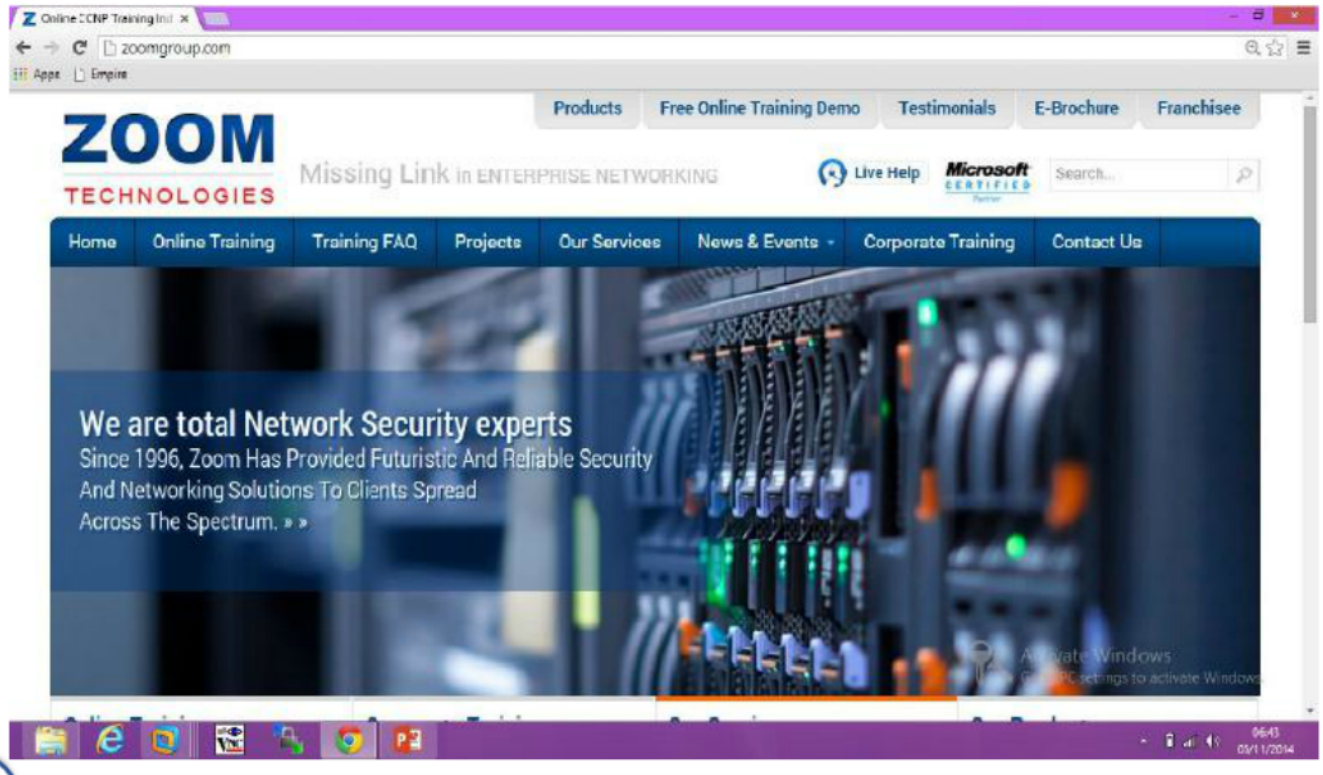





## Web Browsing



## Web Browsing

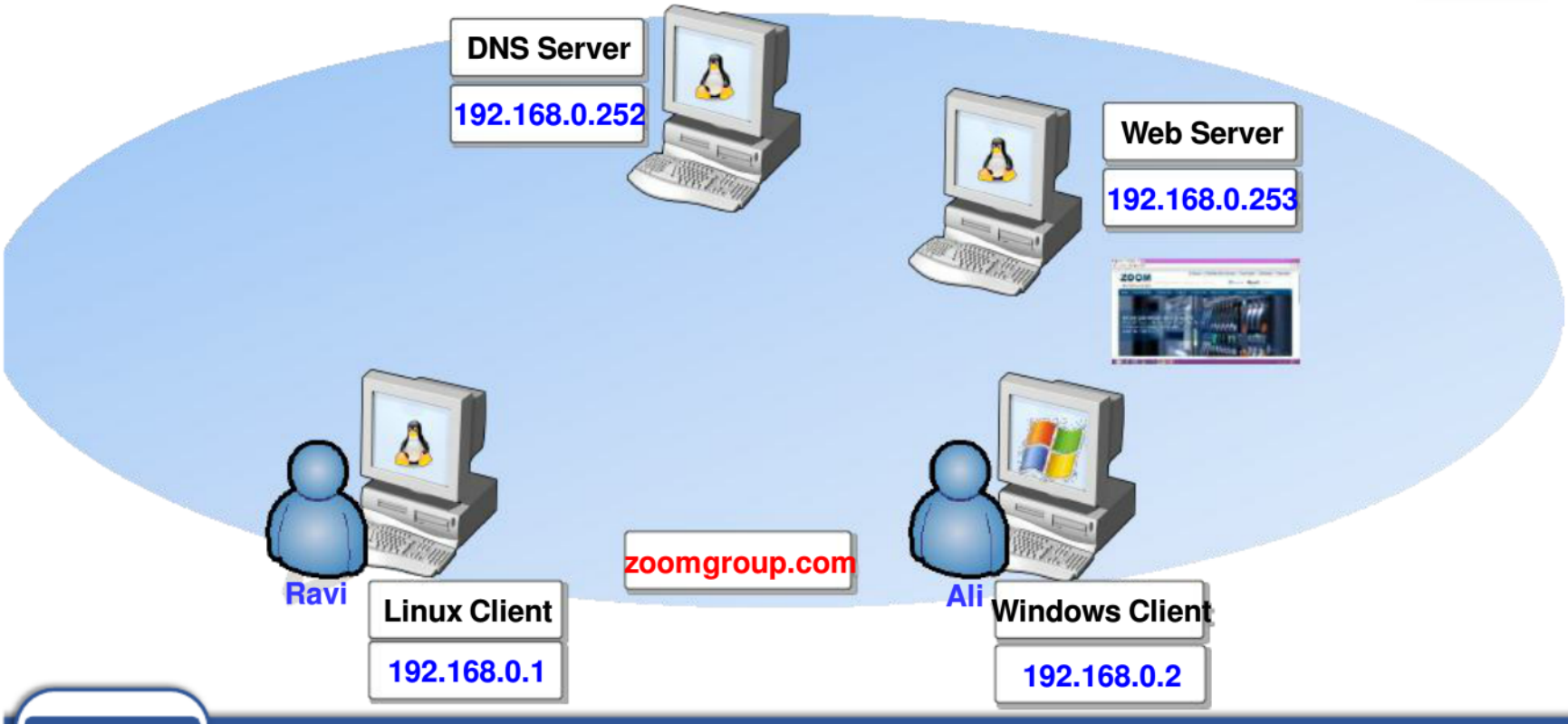





## Apache Web Server Requirements

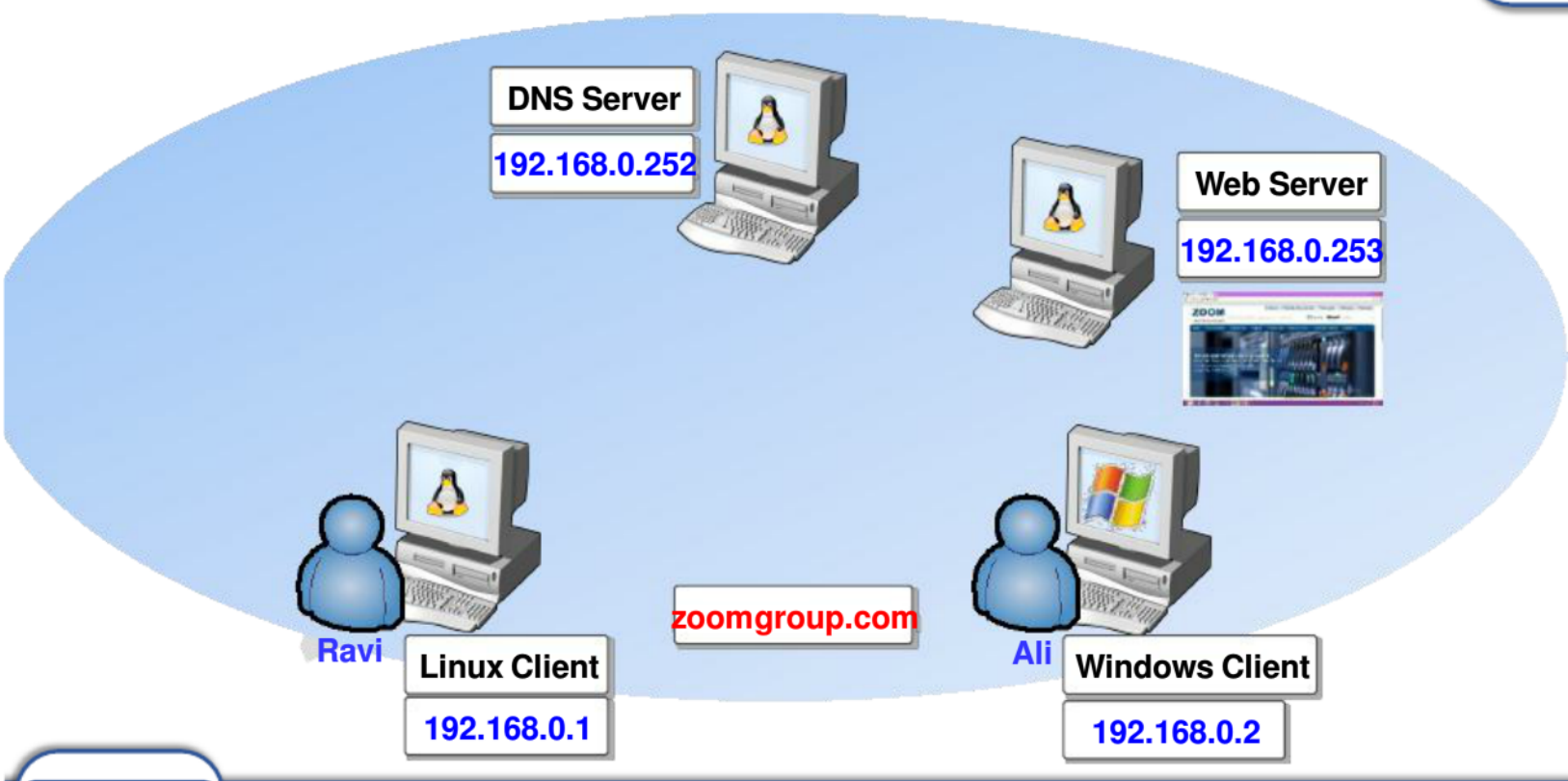
- **Packages**
  - **httpd*.rpm**
- **Port Numbers**
  - **80 Hyper Text Transfer Protocol (HTTP)**
- **Configuration File**
  - **/etc/httpd/conf/httpd.conf**
- **Service / Daemon**
  - **httpd**

## Configuration






## Authentication Configuration



Install the Apache packages

[root@webserver ~]# **yum install httpd* -y**







Edit the configuration file

[root@webserver ~]# **vi /etc/httpd/conf/httpd.conf**

**Add the below options**

```
<VirtualHost *:80>
ServerAdmin root@zoomgroup.com
ServerName www.zoomgroup.com:80
DocumentRoot "/var/www/html"
DirectoryIndex zoomgroup.html
</VirtualHost>
```

Restart the web service temporary

[root@webserver ~]# **service httpd restart**

Restart the web service permanent

[root@webserver ~]# **systemctl enable httpd**





Install the DNS packages

[root@dns ~]# **yum install bind* -y**

Edit the configuration file

[root@dns ~]# **vi /etc/named.conf**

**Change the below options**

```
listen-on port 53 { 127.0.0.0;  192.168.0.252;  };

allow-query { localhost;  192.168.0.0/24;  };
```





Edit the configuration file

[root@dns ~]# **vi /etc/named.rfc1912.zones**

**Add the lines at the bottom of the file**

```
zone "zoomgroup.com"  IN {
        type master;
        file “zoom.for";
};
```

Copy the forward lookup zone file for editing

[root@dns ~]# **cd /var/named**

[root@dns named]# **cp -p named.localhost zoom.for**







Edit the configuration file

[root@dns named]# **vi zoom.for**

**Make the following entries**

```
$TTL  86400
@                IN       SOA     dns.zoomgroup.com.
root.zoomgroup.com.(
                                          0          ; serial (d. adams)
                                          1D         ; refresh
                                          3H         ; retry
                                          1W         ; expiry
                                          1D )       ; minimum
                 IN NS                dns.zoomgroup.com.
dns              IN A                 192.168.0.252
webserver        IN A                 192.168.0.253
www              IN CNAME             webserver
```

Configure primary DNS server address

[root@dns ~]# **vi /etc/resolv.conf**

**Add the DNS server IP address**

**nameserver 192.168.0.252**



Restart the DNS service

[root@dns ~]# **service named restart**

Restart the DNS service

[root@dns ~]# **systemctl enable named**

To check the resolution

[root@dns ~]# **dig www.zoomgroup.com**

Configure primary DNS server address

[root@client1 ~]# **vi /etc/resolv.conf**

**Add the DNS server IP address**

**nameserver 192.168.0.252**





Linux Client Configuration

**To access the website**

**Open a browser (FireFox).**
**In the URL address box type**
**http://www.zoomgroup.com or http://192.168.0.253**



LINUX

## Windows Client Configuration

**To access the website**

**Configure the DNS IP address in the TCP/IP properties**
**Open a browser (Internet Explore, FireFox, etc).**
**In the URL address box type**
**http://www.zoomgroup.com or http://192.168.0.253**





## Authentication Configuration

Edit the configuration file

[root@webserver ~]# **vi /etc/httpd/conf/httpd.conf**

**Add the below lines**

```
<Directory /var/www/html>
   AuthUserFile  /etc/httpd/conf/htpasswd
   AuthName   "WebAuthentication"
   AuthType  Basic
   Require  valid-user
</Directory>
```

Create a user and assign a password

[root@webserver ~]# **htpasswd -c /etc/httpd/conf/htpasswd ravi**
**New password: ******
**Re-type new password: ******







Restart the web service temporary

[root@webserver ~]# **service httpd restart**

Restart the web service permanent

[root@webserver ~]# **systemctl enable httpd**

**To access the website**

Open a browser (FireFox).
In the URL address box type
http://www.zoomgroup.com or http://192.168.0.253



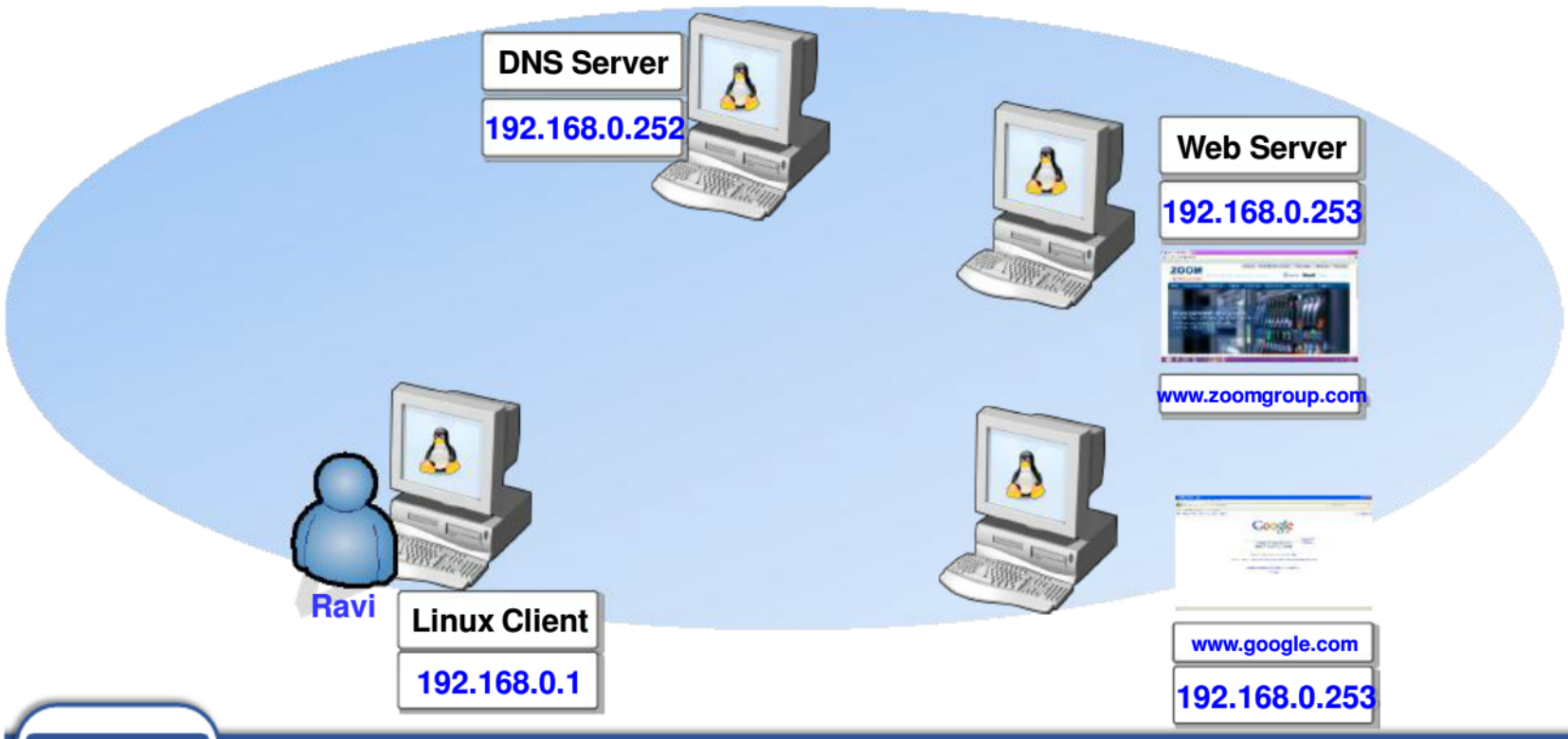
## Virtual Hosting

- Hosting more than one website on a single server is called as Virtual Hosting.
- Types of virtual hosting:
  - Name based virtual hosting
  - IP based virtual hosting
  - Port based virtual hosting

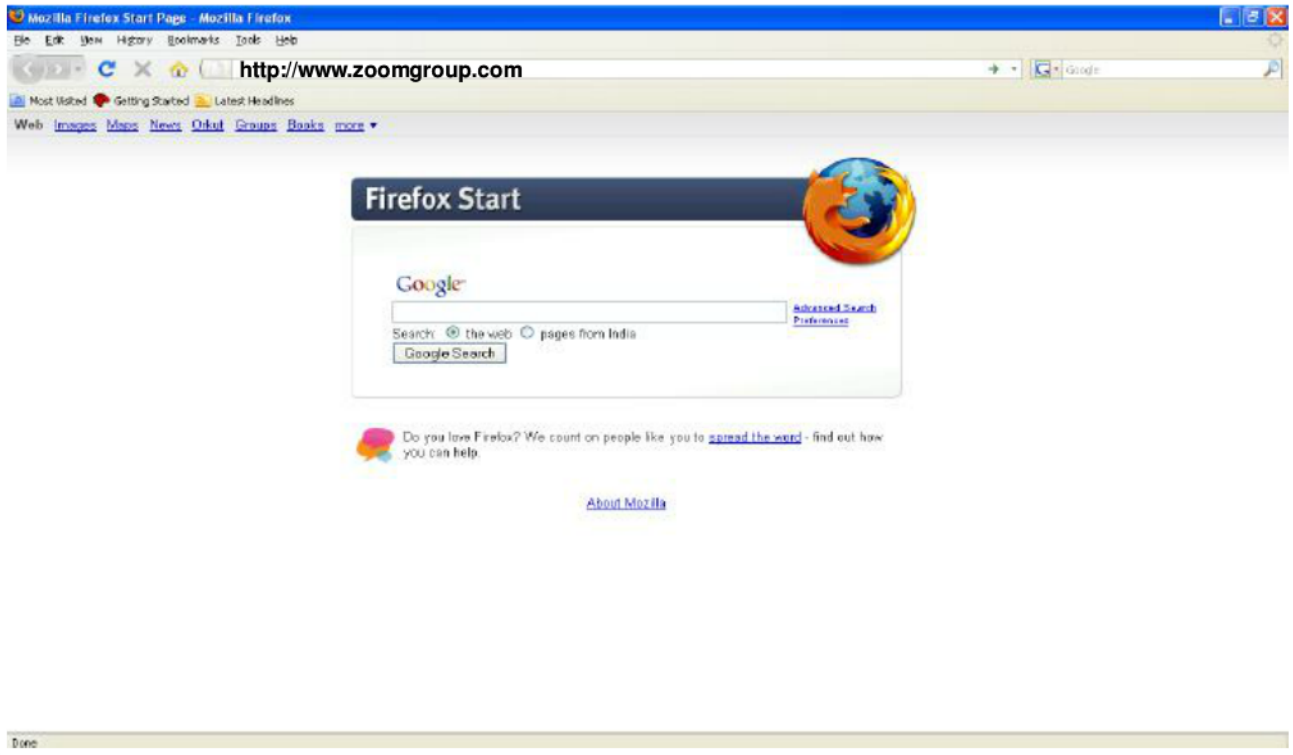




## Name Based Virtual Hosting

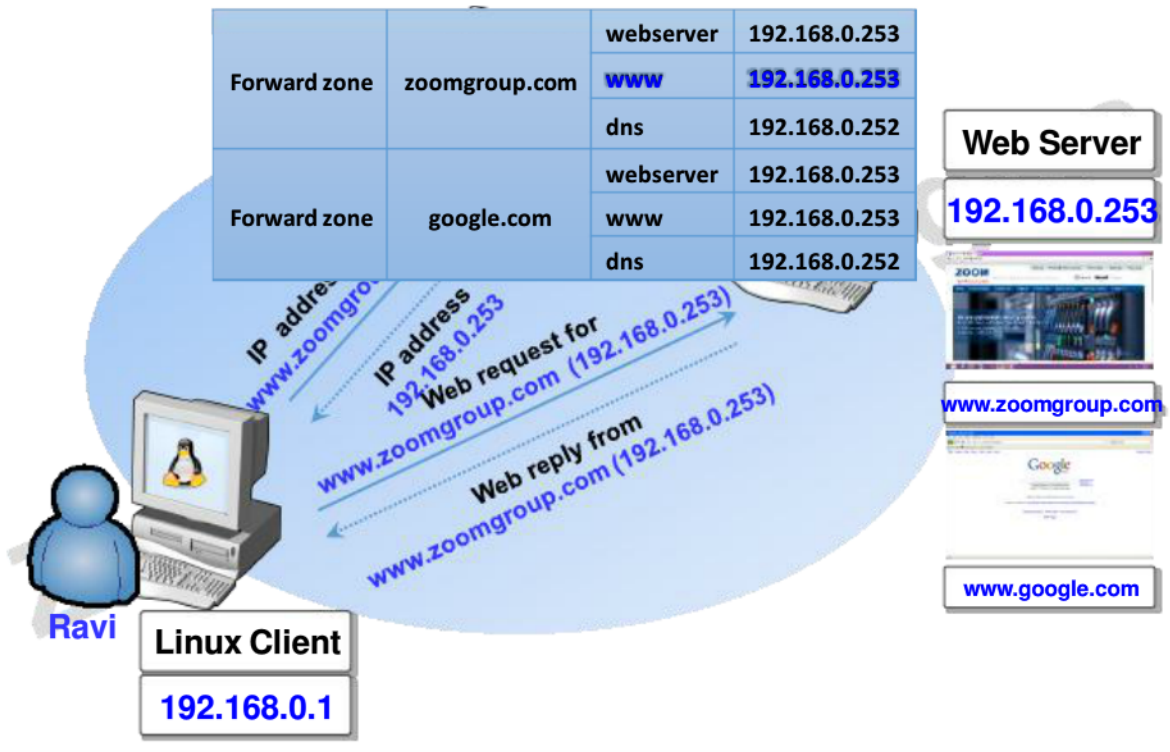


# Web Browsing – Named Based Virtual Hosting

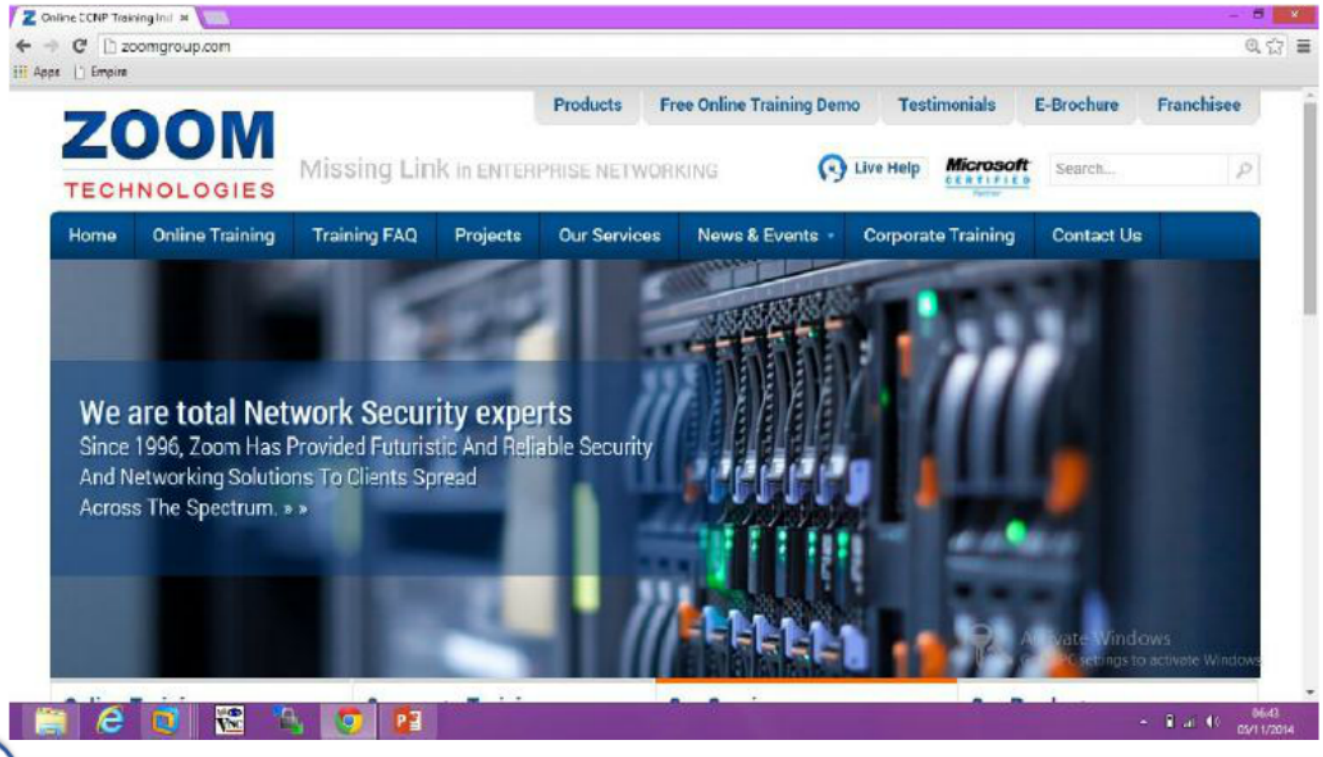





# Web Browsing – Named Based Virtual Hosting



# Web Browsing – Named Based Virtual Hosting

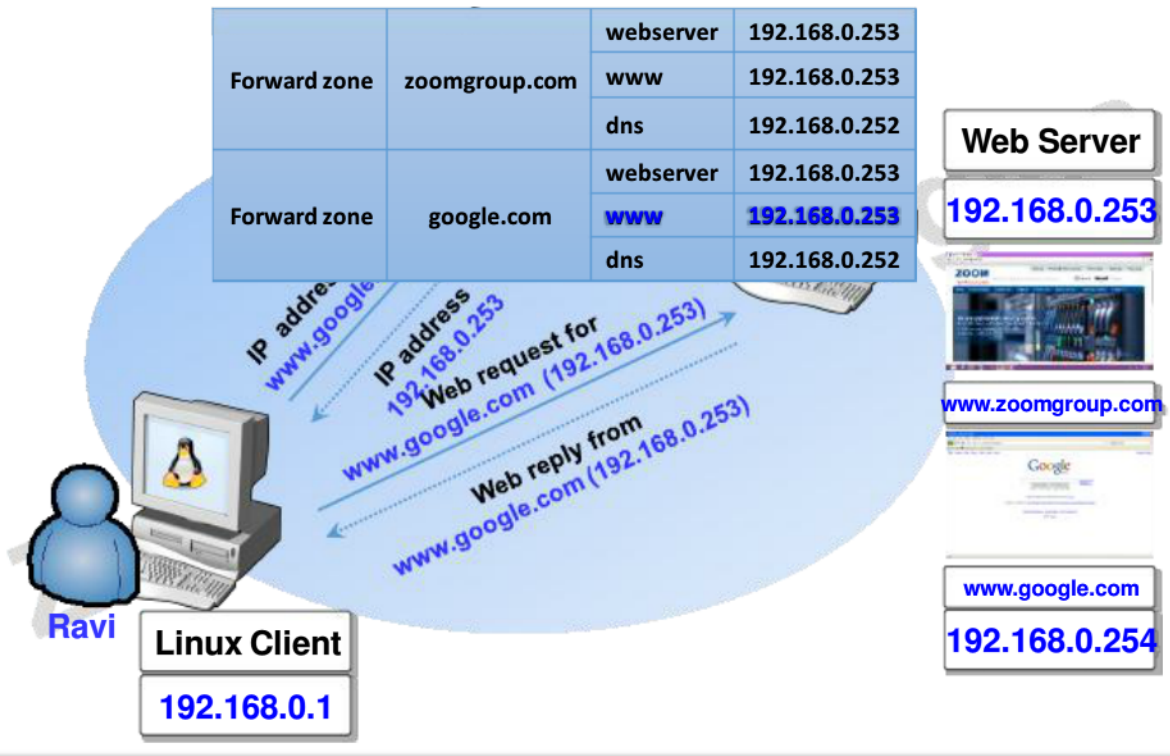





# Web Browsing – Named Based Virtual Hosting


LINUX

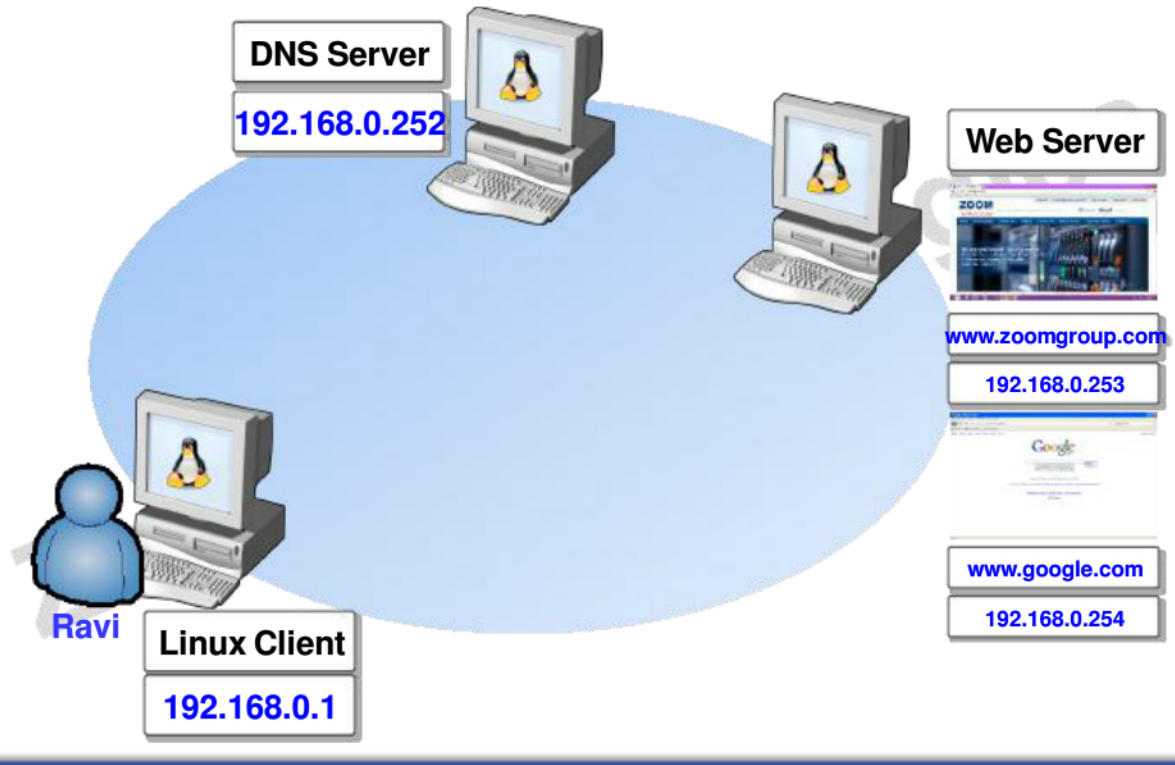
## Web Browsing – Named Based Virtual Hosting



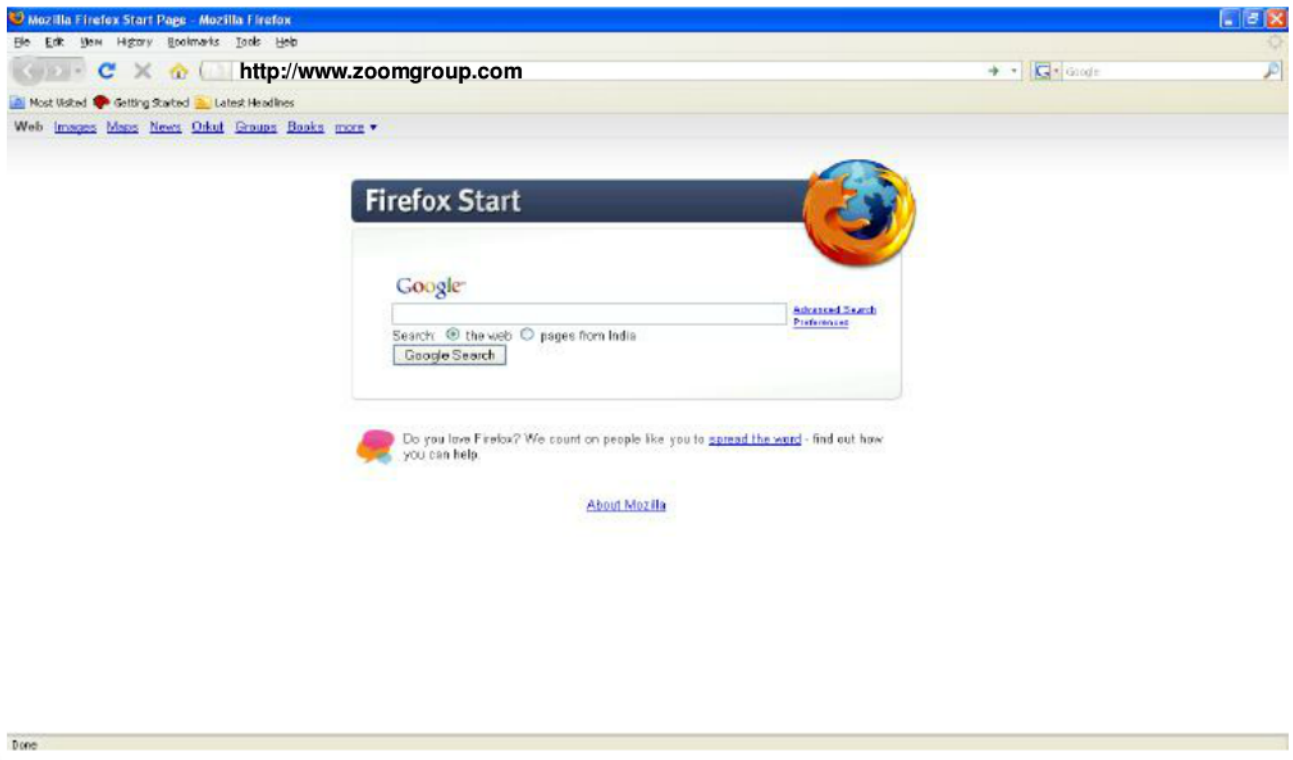



## Web Browsing – Named Based Virtual Hosting

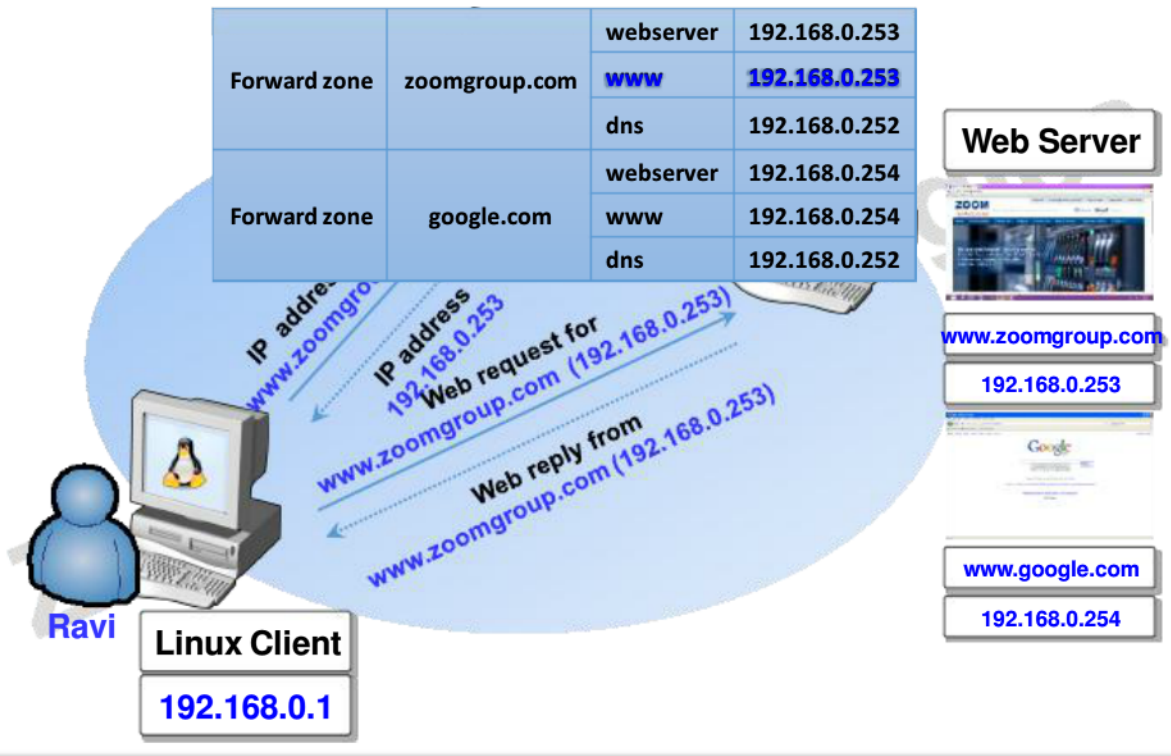
## IP Based Virtual Hosting




## Web Browsing – IP Based Virtual Hosting

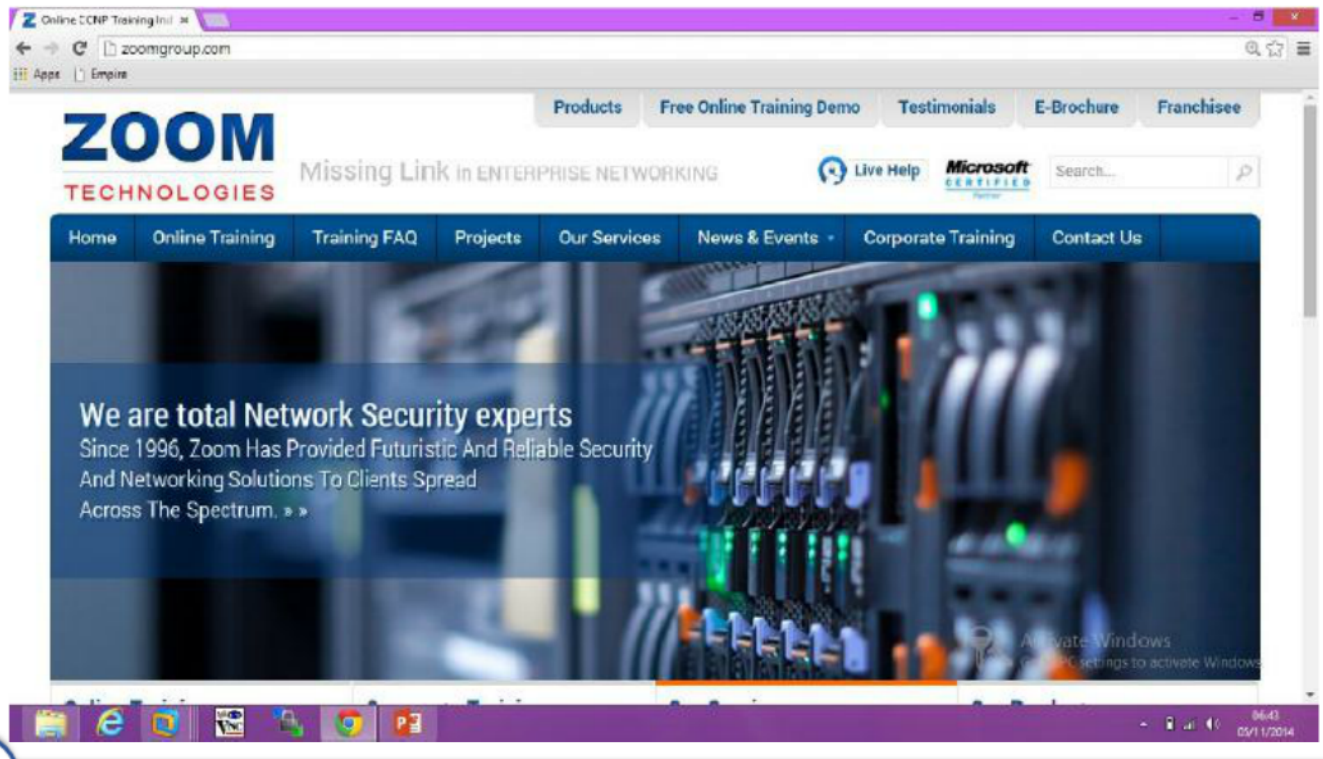


## Web Browsing – IP Based Virtual Hosting





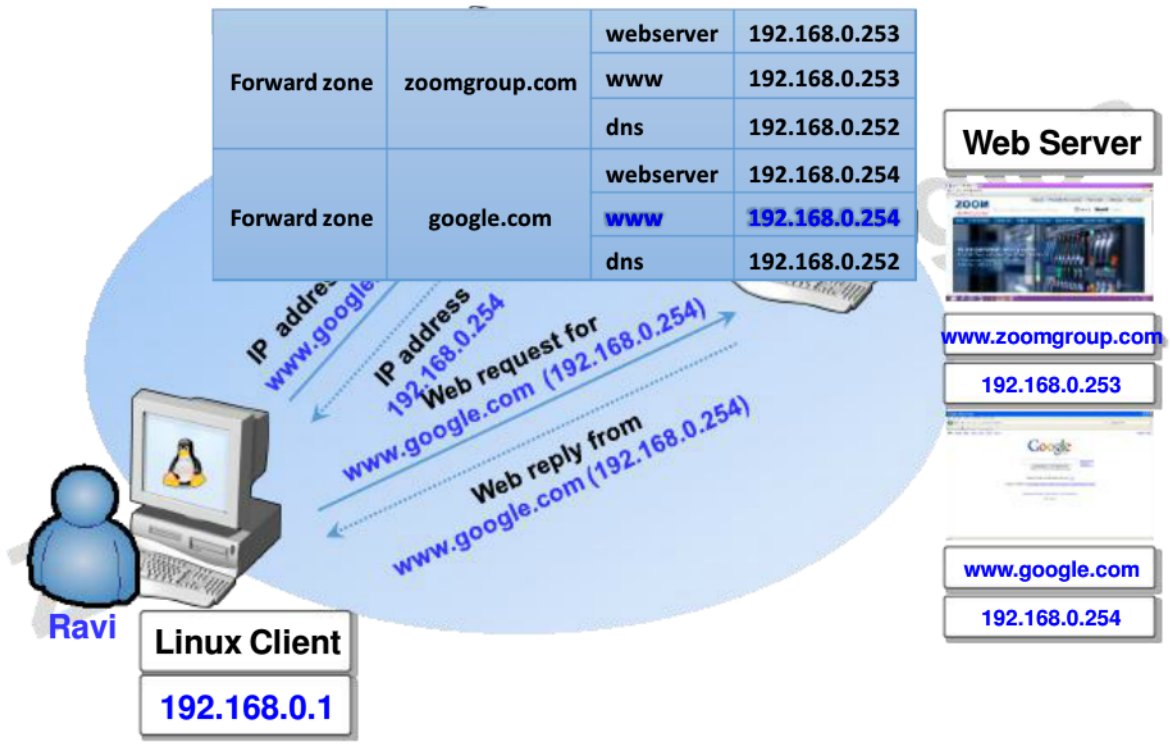

## Web Browsing – IP Based Virtual Hosting



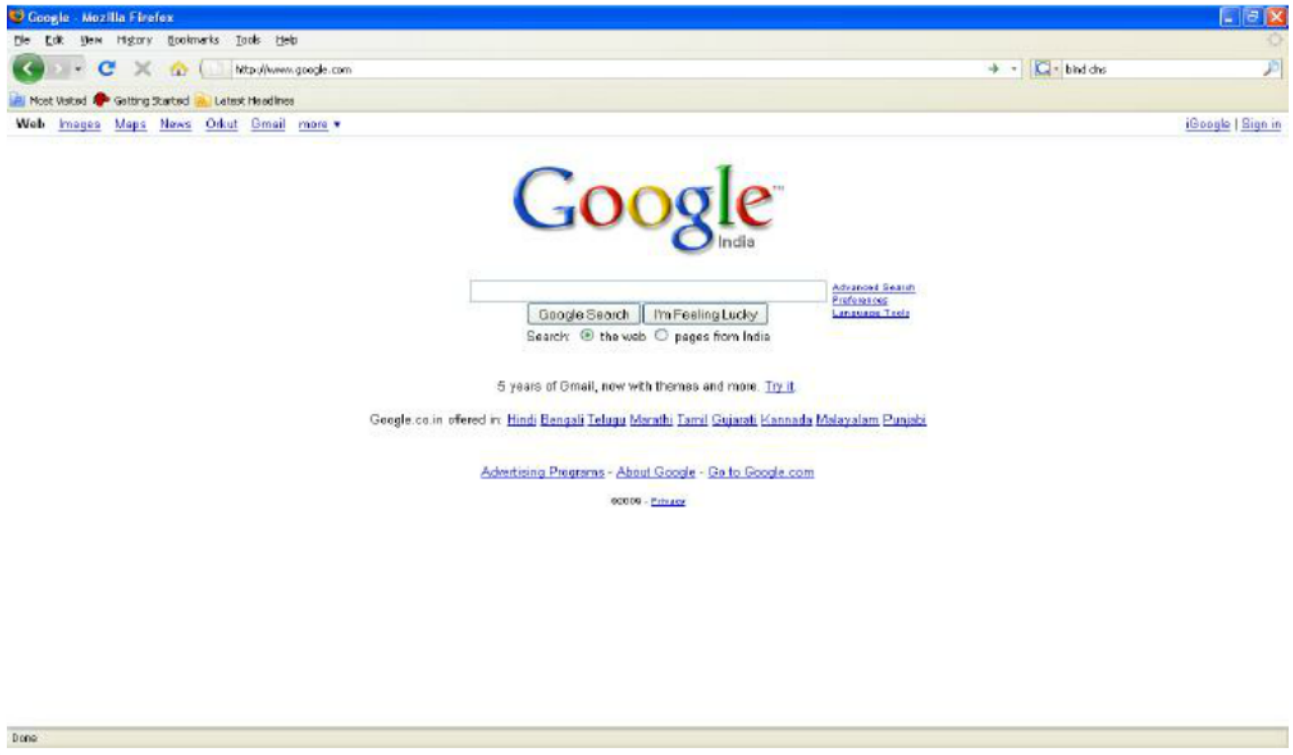
# Web Browsing – IP Based Virtual Hosting




# Web Browsing – IP Based Virtual Hosting

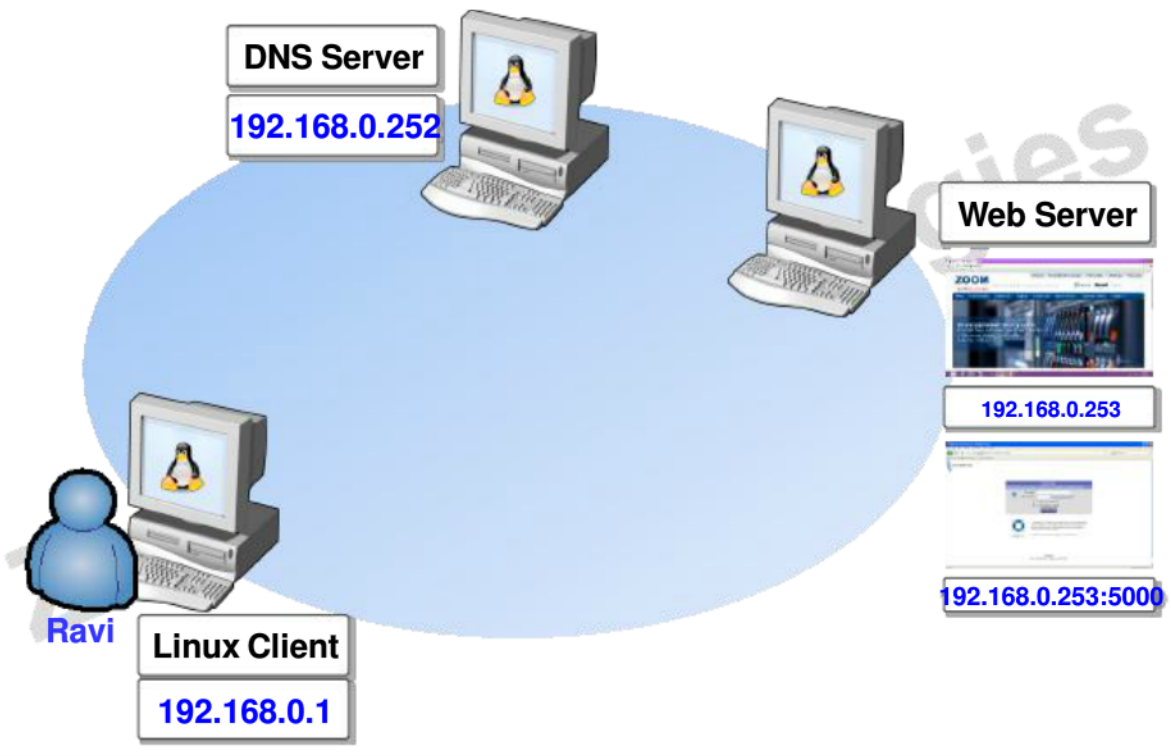


## Web Browsing – IP Based Virtual Hosting

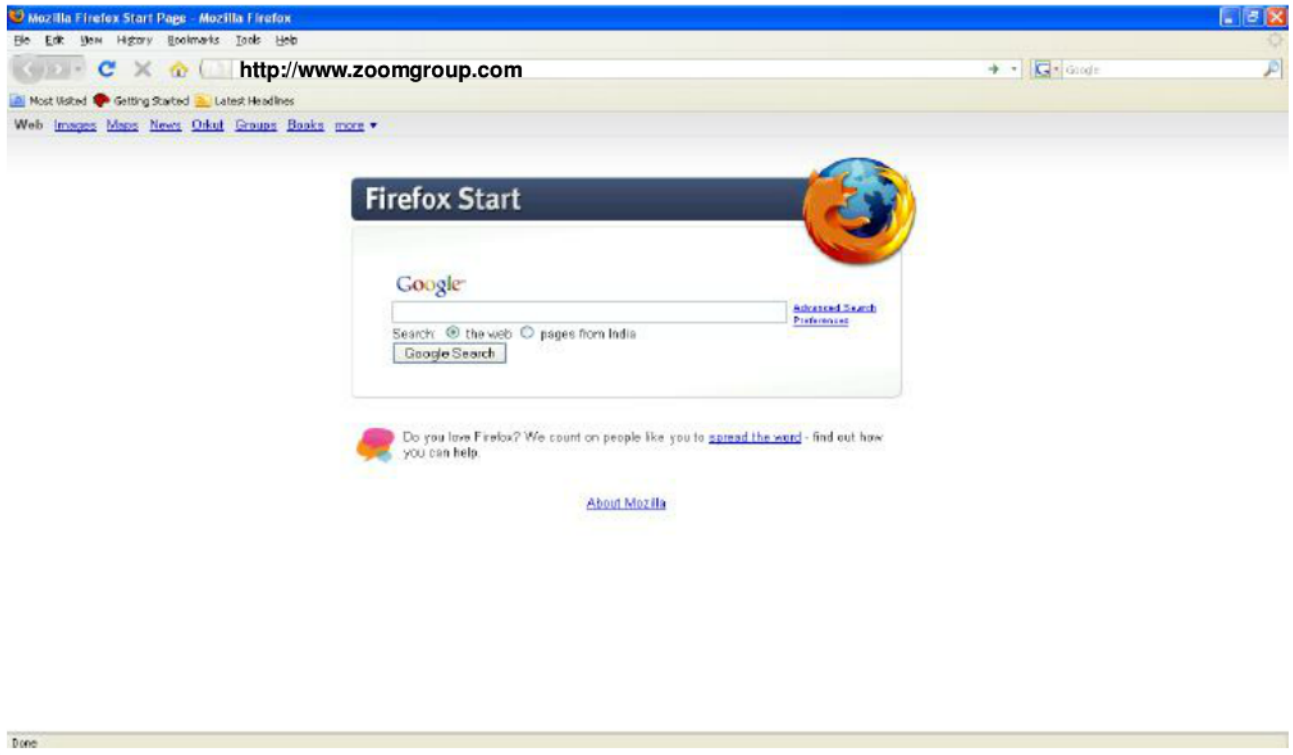





## Port Based Virtual Hosting

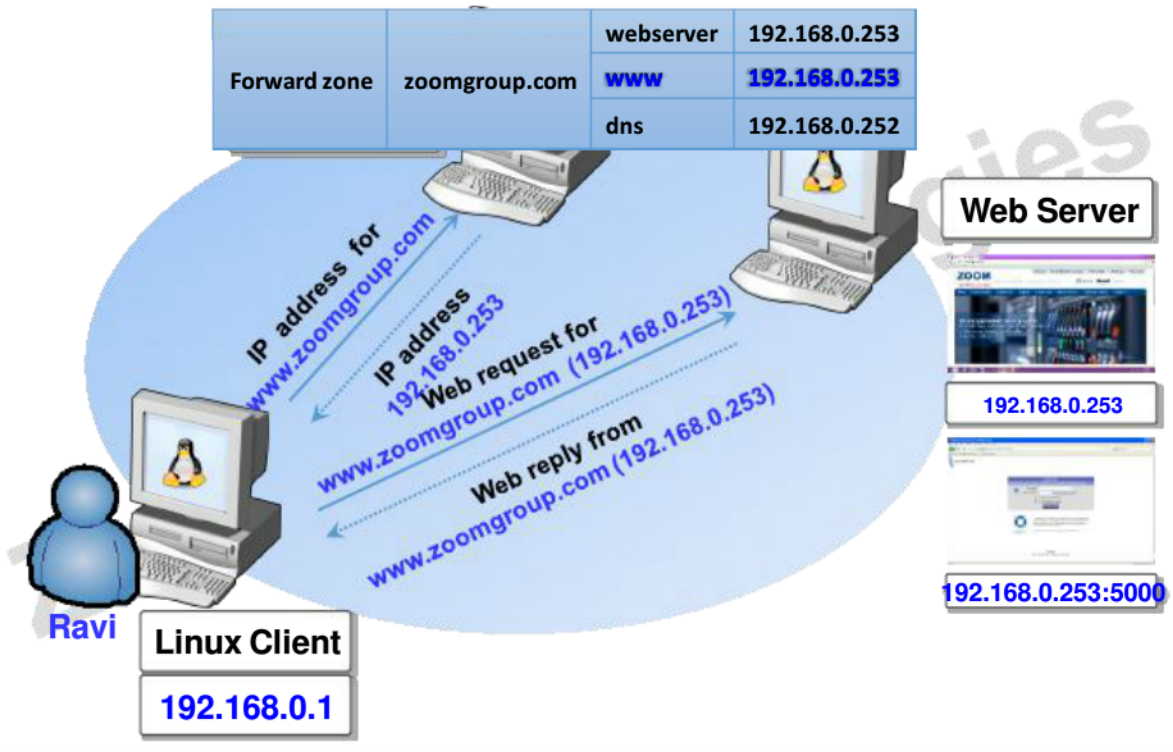


# Web Browsing – Port Based Virtual Hosting

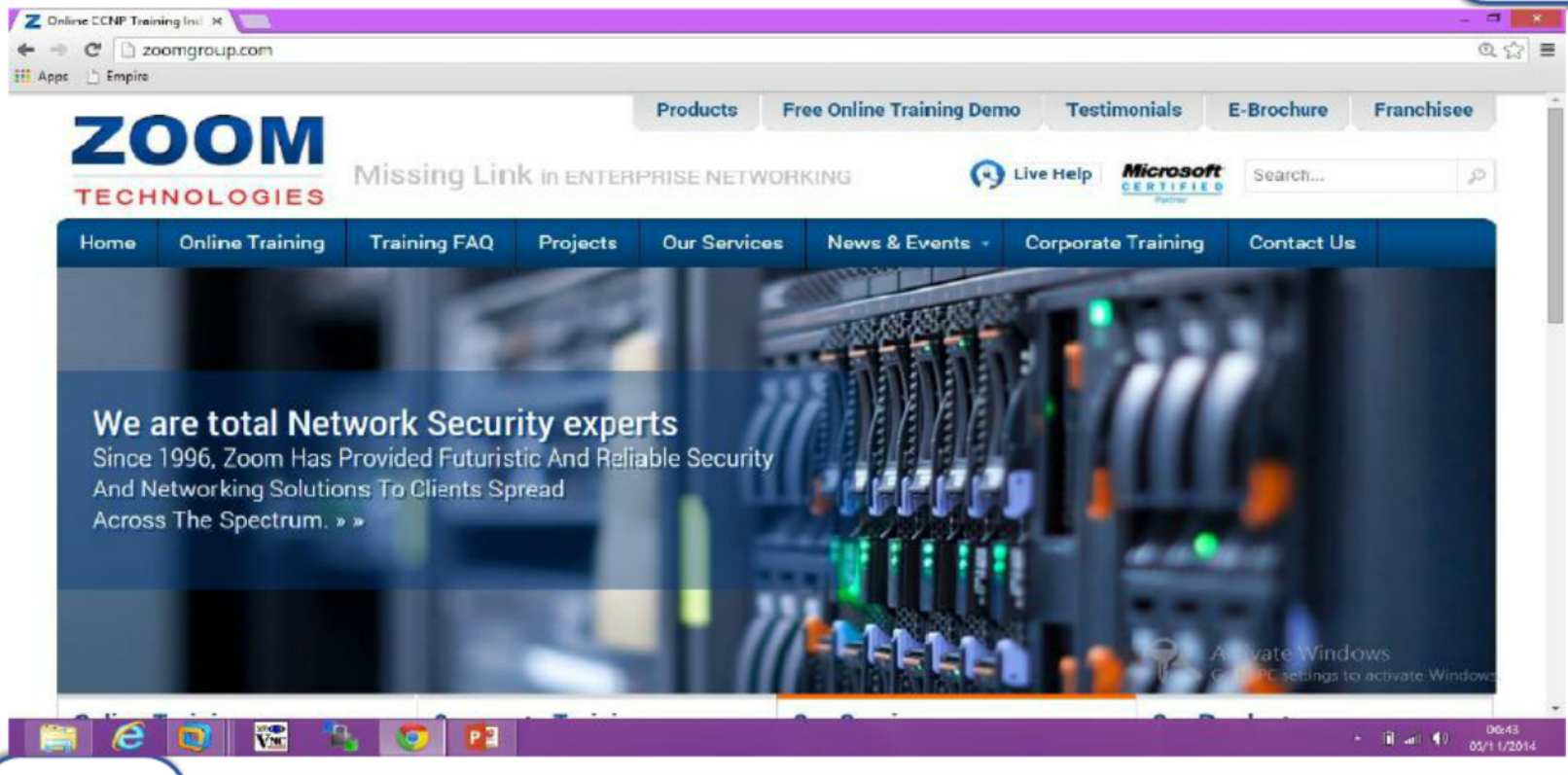





# Web Browsing – Port Based Virtual Hosting



# Web Browsing – Port Based Virtual Hosting

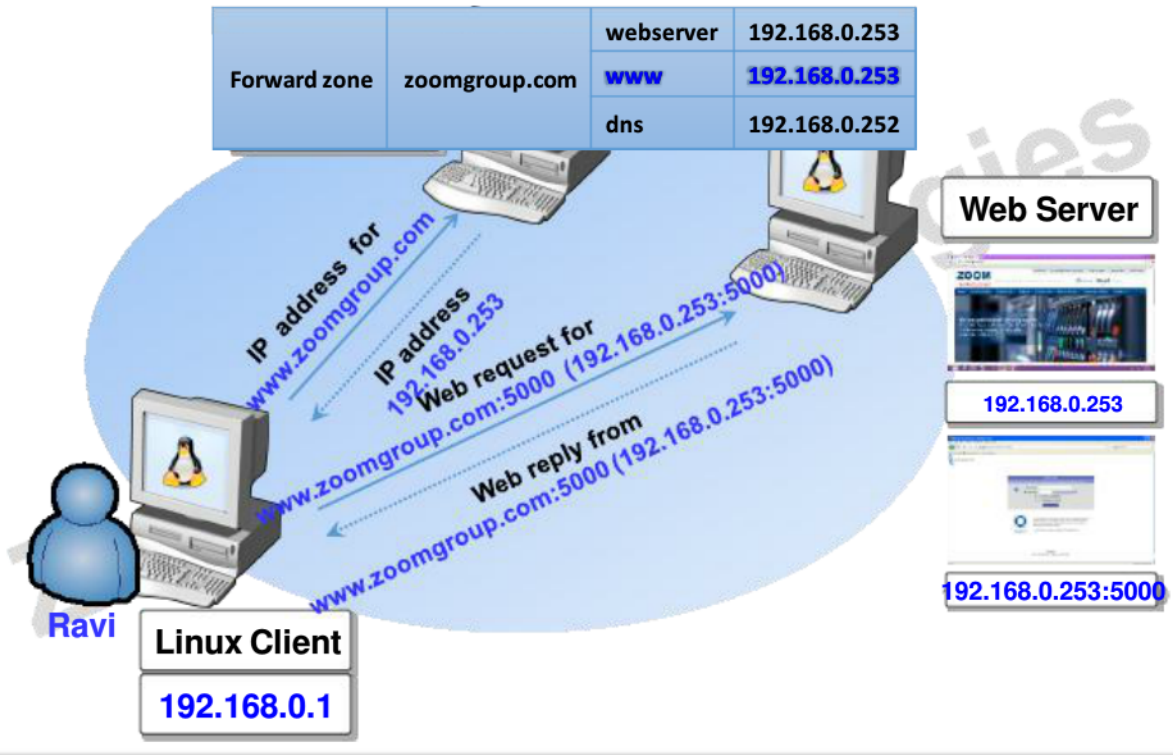



LINUX

# Web Browsing – Port Based Virtual Hosting

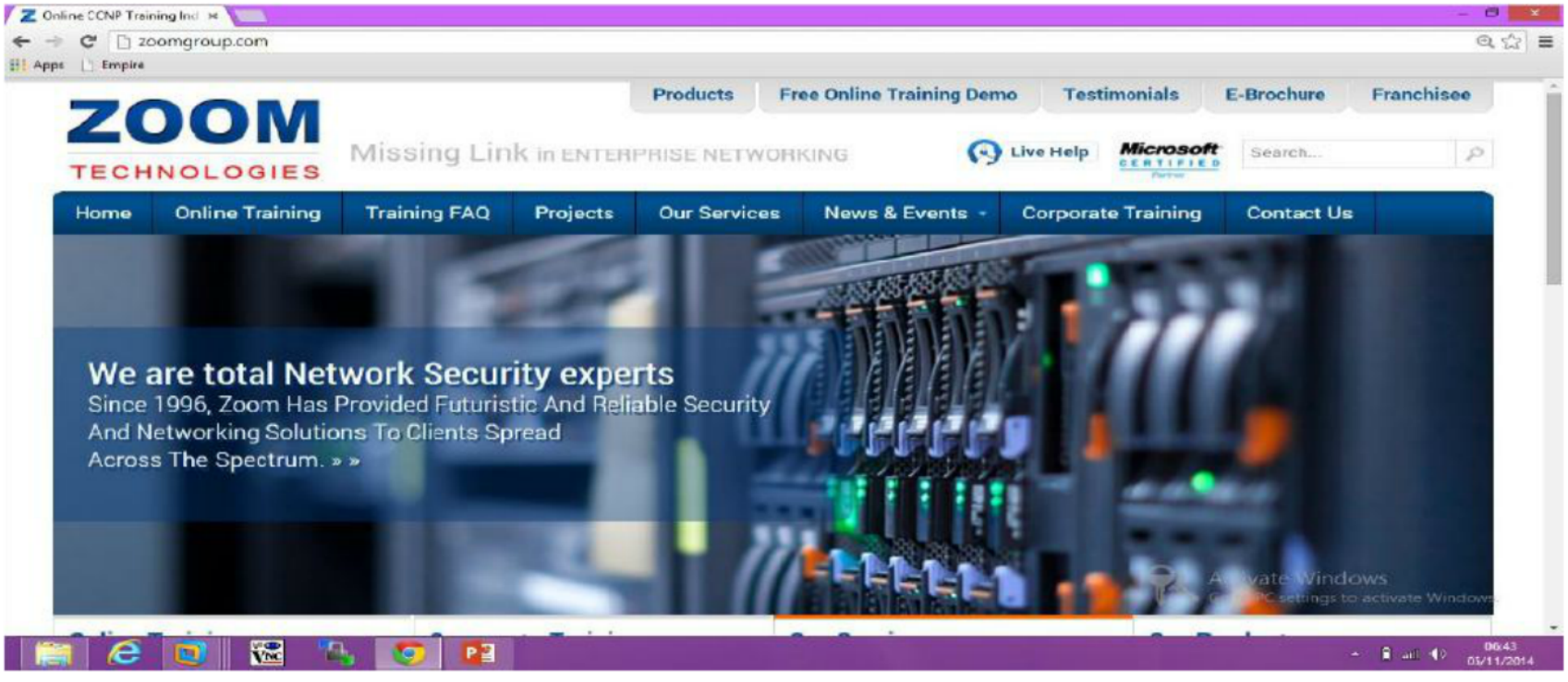

LINUX

## Web Browsing – Port Based Virtual Hosting

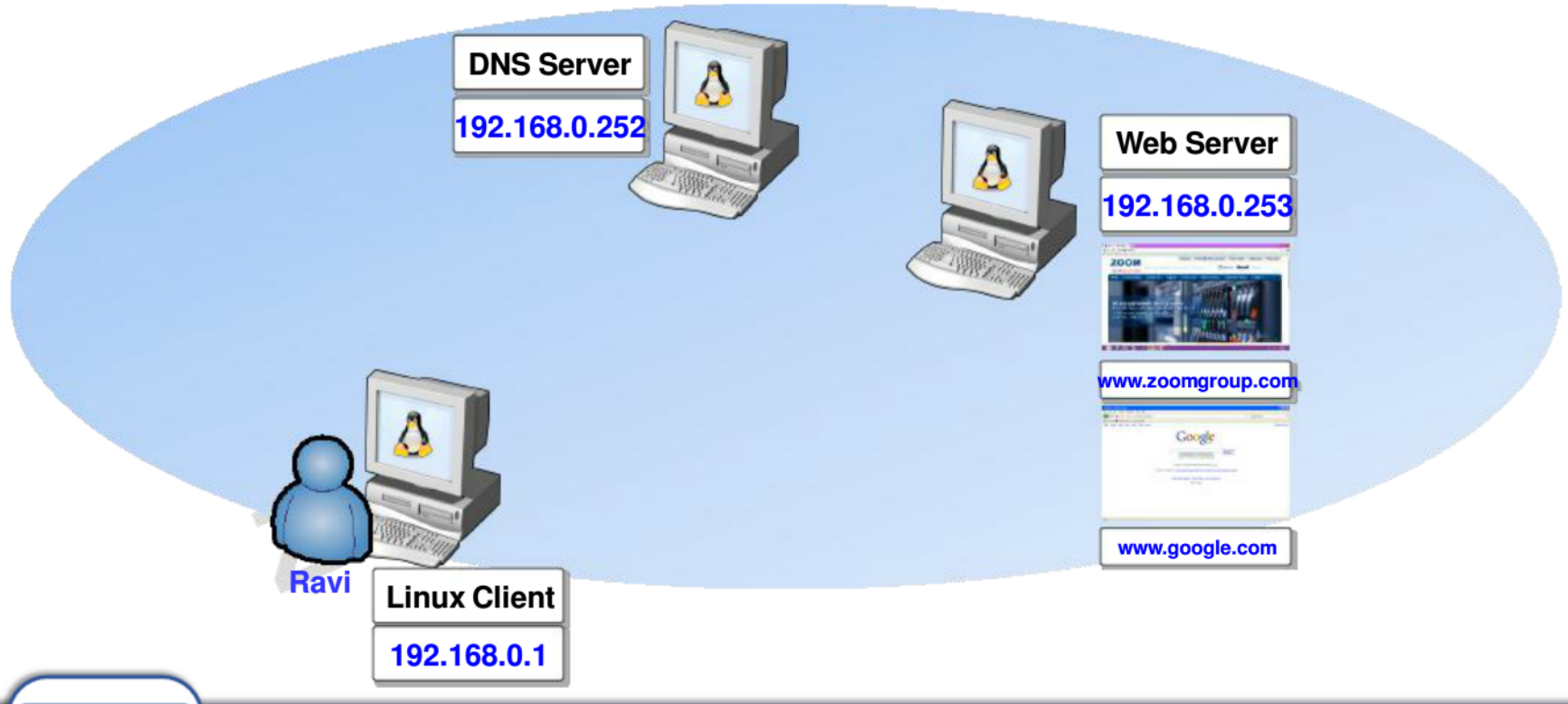





## Web Browsing – Port Based Virtual Hosting



## Name Based Virtual Hosting






## Apache Web Server Configuration

Install the Apache packages

[root@webserver ~]# **yum install httpd* -y**

Edit the configuration file

[root@webserver ~]# **vi /etc/httpd/conf/httpd.conf**

Add the below lines at the end of the file

```
NameVirtualHost *:80
<VirtualHost *:80>
        ServerAdmin  root@zoomgroup.com
        DocumentRoot  /var/www/html
        ServerName  www.zoomgroup.com
        DirectoryIndex  zoomgroup.html
</VirtualHost>
```



Name Based Virtual Hosting Configuration

```
<VirtualHost *:80>
        ServerAdmin  root@google.com
        DocumentRoot  /var/www/html
        ServerName  www.google.com
        DirectoryIndex  google.html
</VirtualHost>
```



LINUX

## Name Based Virtual Hosting Configuration

Restart the web service

[root@webserver ~]# **service httpd restart**





## DNS Server Configuration

Install the DNS packages

[root@dns ~]# **yum install bind* -y**

Edit the configuration file

[root@dns ~]# **vi /etc/named.conf**

**Change the below options**

```
listen-on port 53 { 127.0.0.0;  192.168.0.252;  };

allow-query { localhost;  192.168.0.0/24;  };
```





Edit the configuration file

[root@dns ~]# **vi /etc/named.rfc1912.zones**

**Add the lines at the bottom of the file**

```
zone "zoomgroup.com"  IN {
        type master;
        file “zoom.for";
};
zone “google.com"  IN {
        type master;
        file “google.for";
};
```

Copy with permissions the forward lookup zone file for editing

[root@dns ~]# **cd /var/named**

[root@dns named]# **cp -p localhost.zone zoom.for**







Edit the configuration file

[root@dns named]# **vi zoom.for**

Make the following entries

```
$TTL 86400
@           IN      SOA     dns.zoomgroup.com.  root.zoomgroup.com.(
                                                0       ; serial (d. adams)
                                                1D      ; refresh
                                                3H      ; retry
                                                1W      ; expiry
                                                1D )    ; minimum
            IN NS               dns.zoomgroup.com.
dns         IN A                192.168.0.252
webserver   IN A                192.168.0.253
www         IN CNAME            webserver
```

Copy with permissions the forward lookup zone file for editing

[root@dns ~]# **cd /var/named**

[root@dns named]# **cp -p named.localhost google.for**







Edit the configuration file

[root@dns named]# **vi google.for**

Make the following entries

```
$TTL 86400
@           IN      SOA     dns.google.com.  root.google.com.(
                                             0          ; serial (d. adams)
                                             1D         ; refresh
                                             3H         ; retry
                                             1W         ; expiry
                                             1D )       ; minimum
            IN NS               dns.google.com.
dns         IN A                192.168.0.252
webserver   IN A                192.168.0.253
www         IN CNAME            webserver
```

## DNS Server Configuration

Restart the DNS service

[root@dns ~]# **service named restart**

Restart the DNS service

[root@dns ~]# **systemctl enable named**

To check the resolution

[root@dns ~]# **dig www.zoomgroup.com**
[root@dns ~]# **dig www.google.com**



## Linux Client Configuration

Configure primary DNS server address

[root@client1 ~]# **vi /etc/resolv.conf**

**Add the DNS server IP address**

**nameserver 192.168.0.252**

ZOOM TECHNOLOGIES

**To access the website**

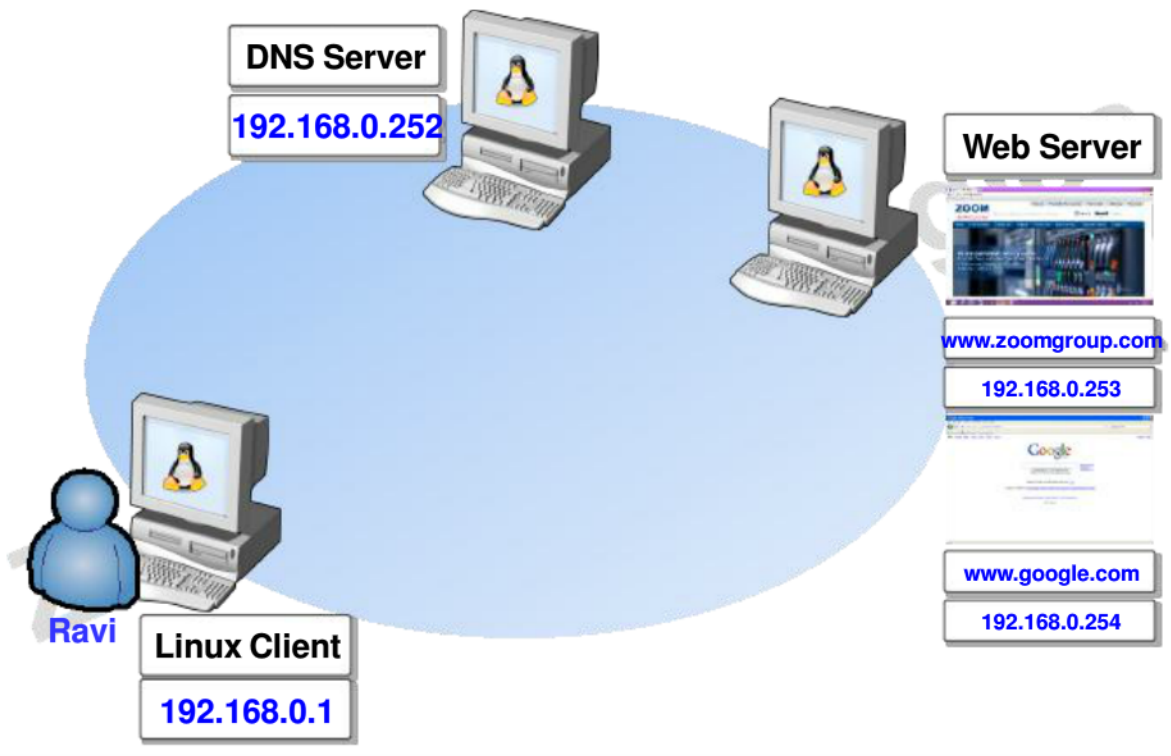
Open a browser (Mozilla, Fire Fox, etc).
In the URL address box type
http://www.zoomgroup.com or http://www.google.com







ZOOM TECHNOLOGIES



## Assign Virtual IP Address

Assigning virtual IP address

[root@webserver ~]# **nmtui**

[root@webserver ~]# **service network restart**





## IP Based Virtual Hosting Configuration

Edit the configuration file

[root@server ~]# **vi /etc/httpd/conf/httpd.conf**

**Change the below options**

```
<VirtualHost 192.168.0.251:80>
        ServerAdmin  root@google.com
        DocumentRoot  /var/www/html
        ServerName  www.google.com
        DirectoryIndex  google.html
</VirtualHost>
```

## IP Based Virtual Hosting Configuration

Restart the web service

[root@webserver ~]# **service httpd restart**





## DNS Server Configuration

Edit the google zone file

[root@dns named]# vi google.for

Make the following entries

```
$TTL 86400
@           IN      SOA     dns.google.com.  root.google.com.(
                                             0          ; serial (d. adams)
                                             1D         ; refresh
                                             3H         ; retry
                                             1W         ; expiry
                                             1D )       ; minimum
            IN NS               dns.google.com.
dns         IN A                192.168.0.252
www         IN A                192.168.0.251
```

Restart the DNS service

```
[root@dns ~]# service named restart
```

To check the resolution

```
[root@dns ~]# dig www.zoomgroup.com
[root@dns ~]# dig www.google.com
```

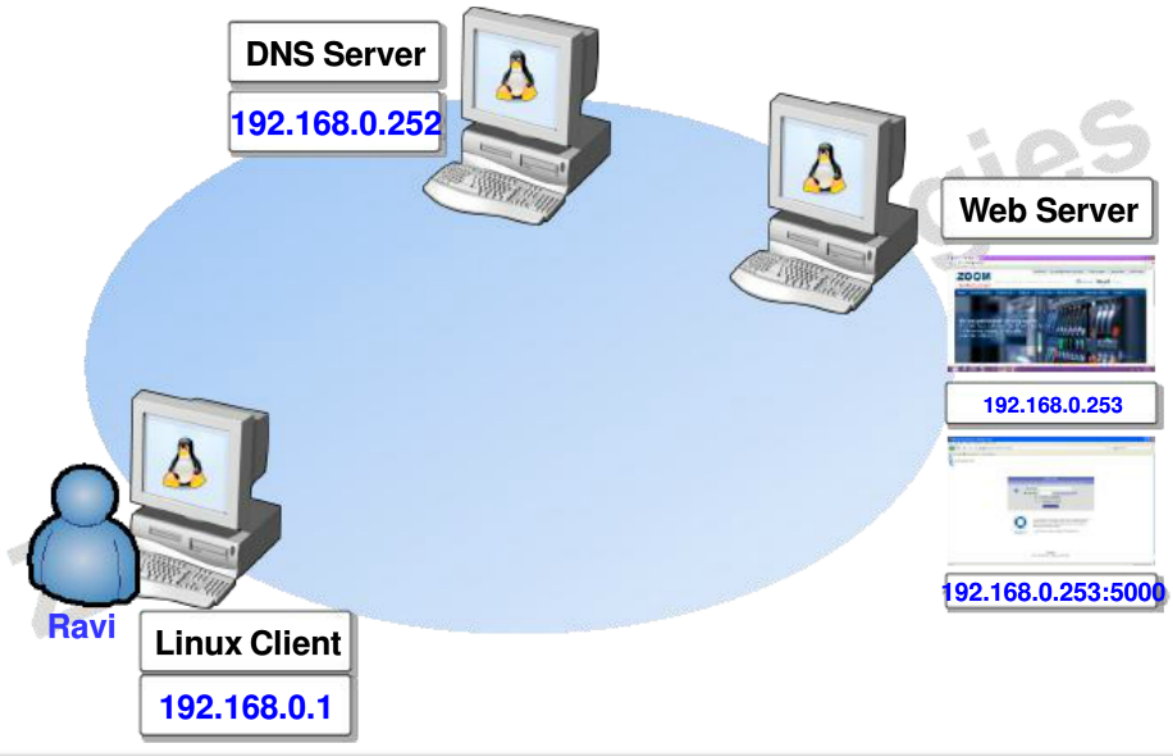




**To access the website**

**Open a browser (Mozilla, Fire Fox, etc).**
**In the URL address box type**
**http://www.zoomgroup.com or http://192.168.0.253**
**http://www.google.com or http://192.168.0.251**

## Port Based Virtual Hosting






## Port Based Virtual Hosting Configuration

Edit the configuration file

[root@webserver ~]# **vi /etc/httpd/conf/httpd.conf**

**Change the below options**

```
Listen 8000
<VirtualHost 192.168.0.253:8000>
        ServerAdmin  root@zoomgroup.com
        DocumentRoot  /var/www/html
        ServerName  www.zoomgroup.com
        DirectoryIndex  zoomgroup.html
</VirtualHost>
```

## Port Based Virtual Hosting Configuration

```
LISTEN 9000
<VirtualHost 192.168.0.251:9000>
        ServerAdmin  root@google.com
        DocumentRoot  /var/www/html
        ServerName  www.google.com
        DirectoryIndex  google.html
</VirtualHost>
```



Port Based Virtual Hosting Configuration

Restart the web service

[root@webserver ~]# **service httpd restart**

Restart the web service permanent

[root@webserver ~]# **systemctl enable httpd**

LINUX

To access the website

Open a browser (Mozilla, Fire Fox, etc).
In the URL address box type
http://www.zoomgroup.com:8000 **or**
http://192.168.0.251:9000



## Webmin

- Webmin is a 3rd party Graphical User Interface (GUI) tool used for Linux /Unix system and network administration.
- Webmin can be downloaded from the link http://webmin.com/
- Webmin is available in a .rpm format as well as a .tar.gz format.
- Download the file from internet or copy it from any media in /opt directory.





## Webmin Installation

To install Webmin using .tar.gz package

```
[root@server ~]# cd /opt
[root@server opt]# tar -xvzf webmin-1.360.tar.gz
[root@server opt]# cd webmin-1.360
[root@server opt ]# ./setup.sh
```

**Accept the default values**

## Webmin access

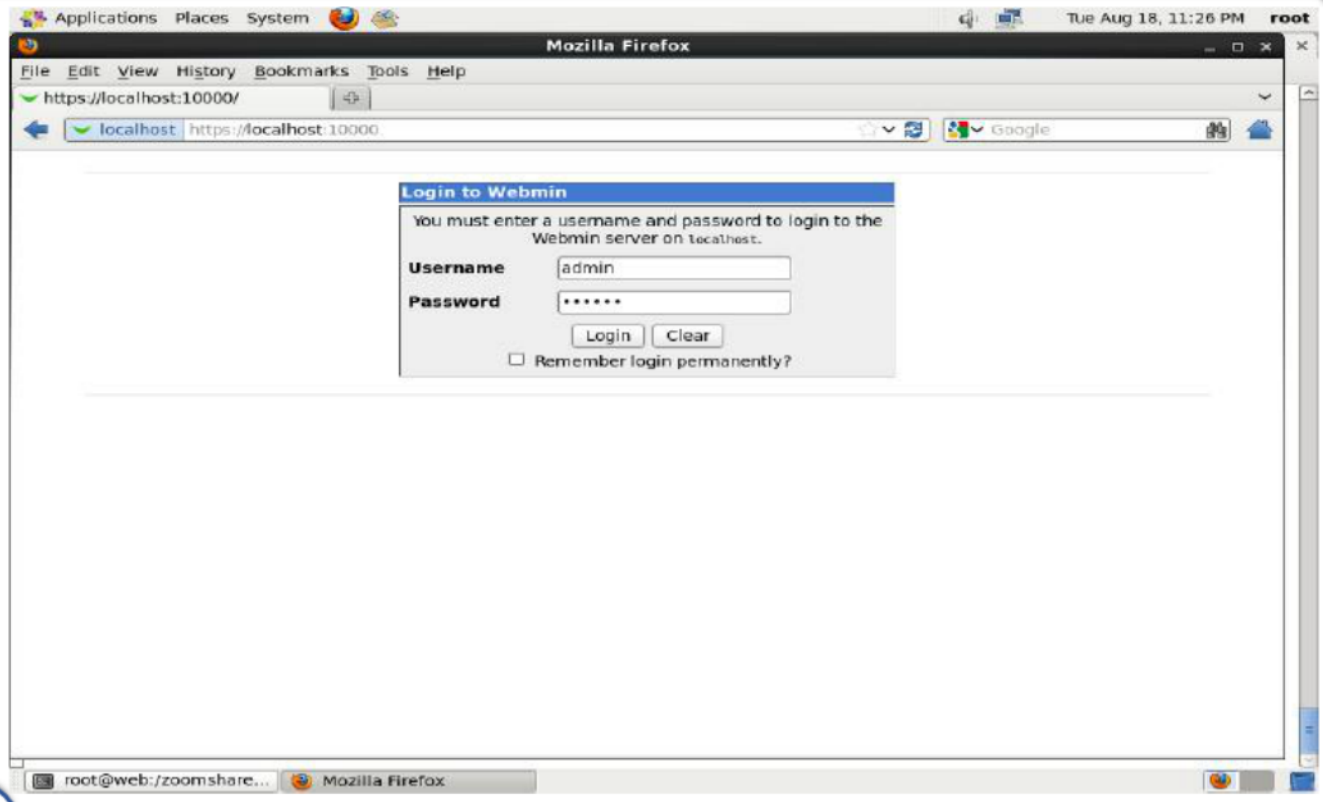
To access Webmin

Open a web browser and type **http://localhost:10000**

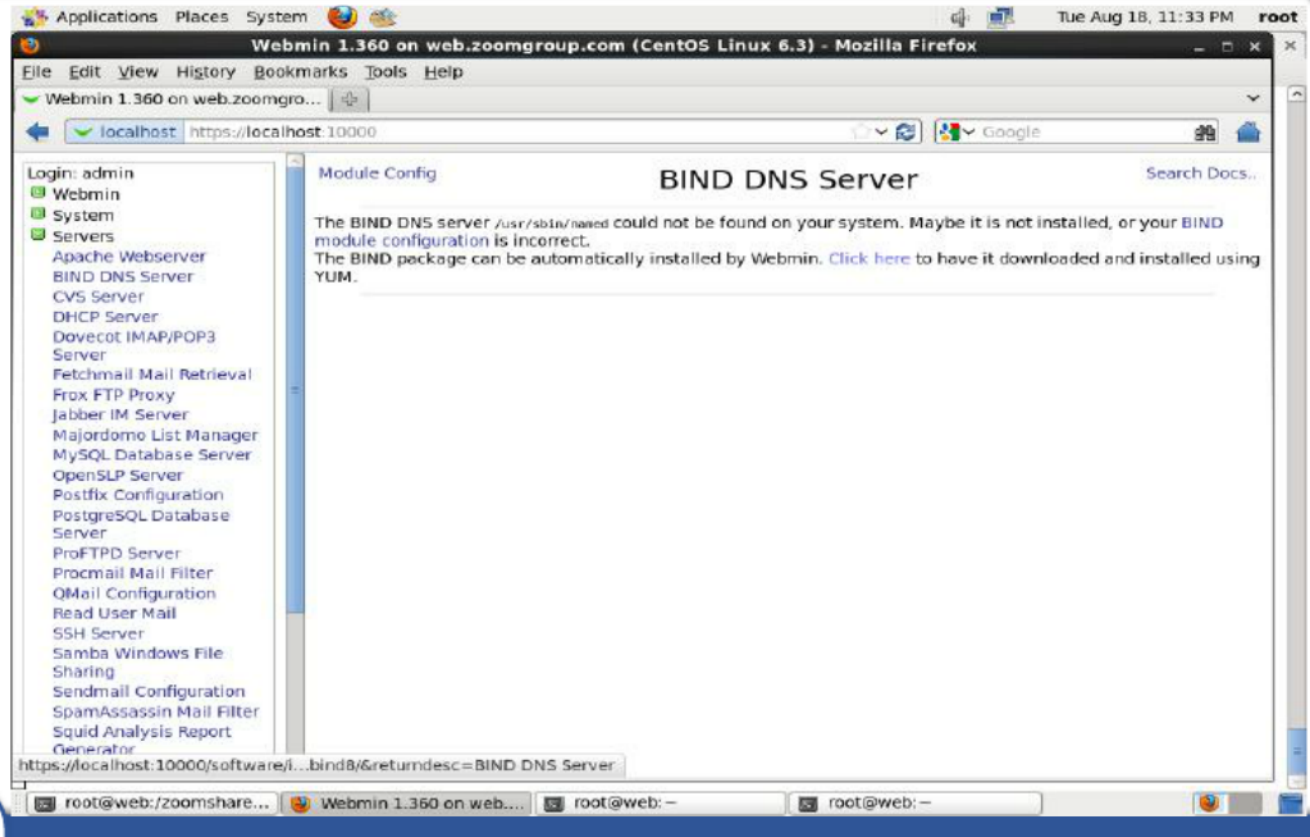




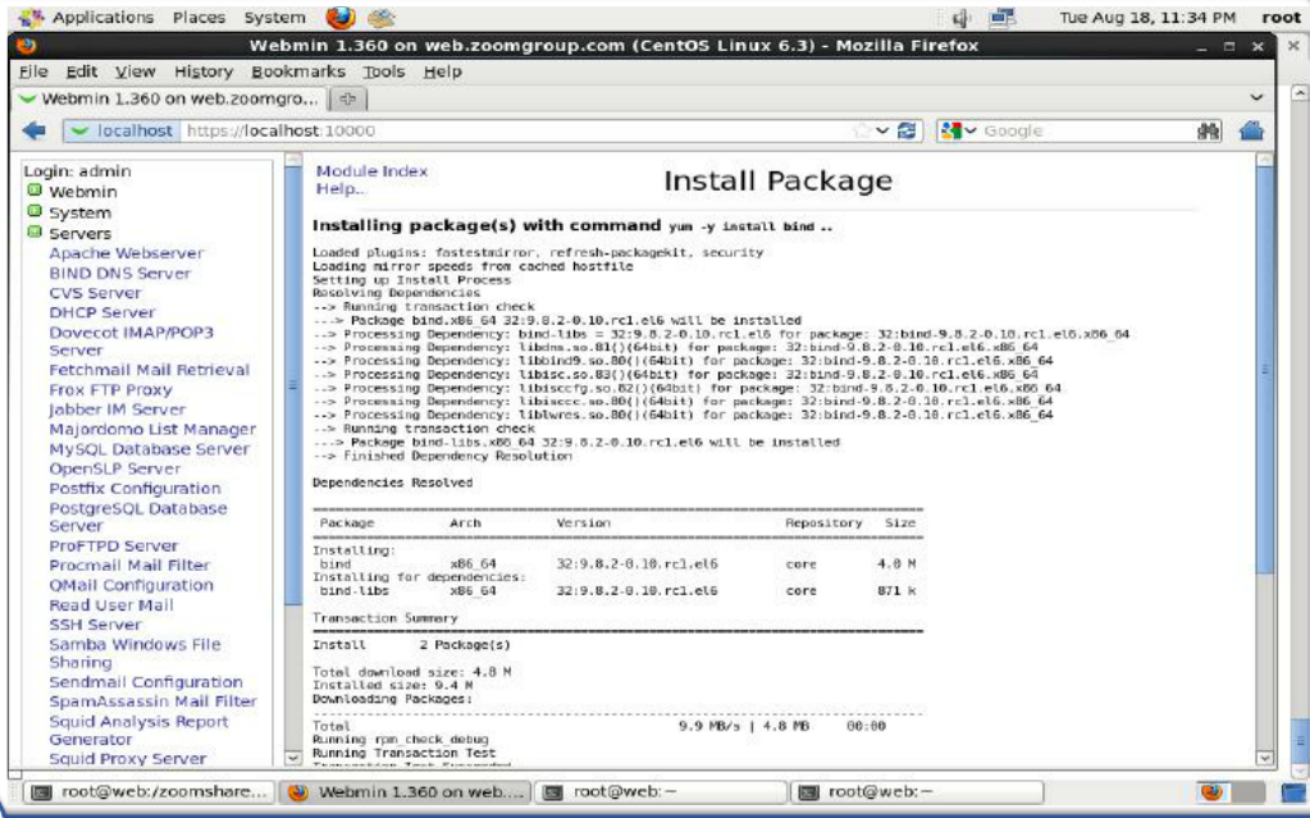
## Webmin Installation



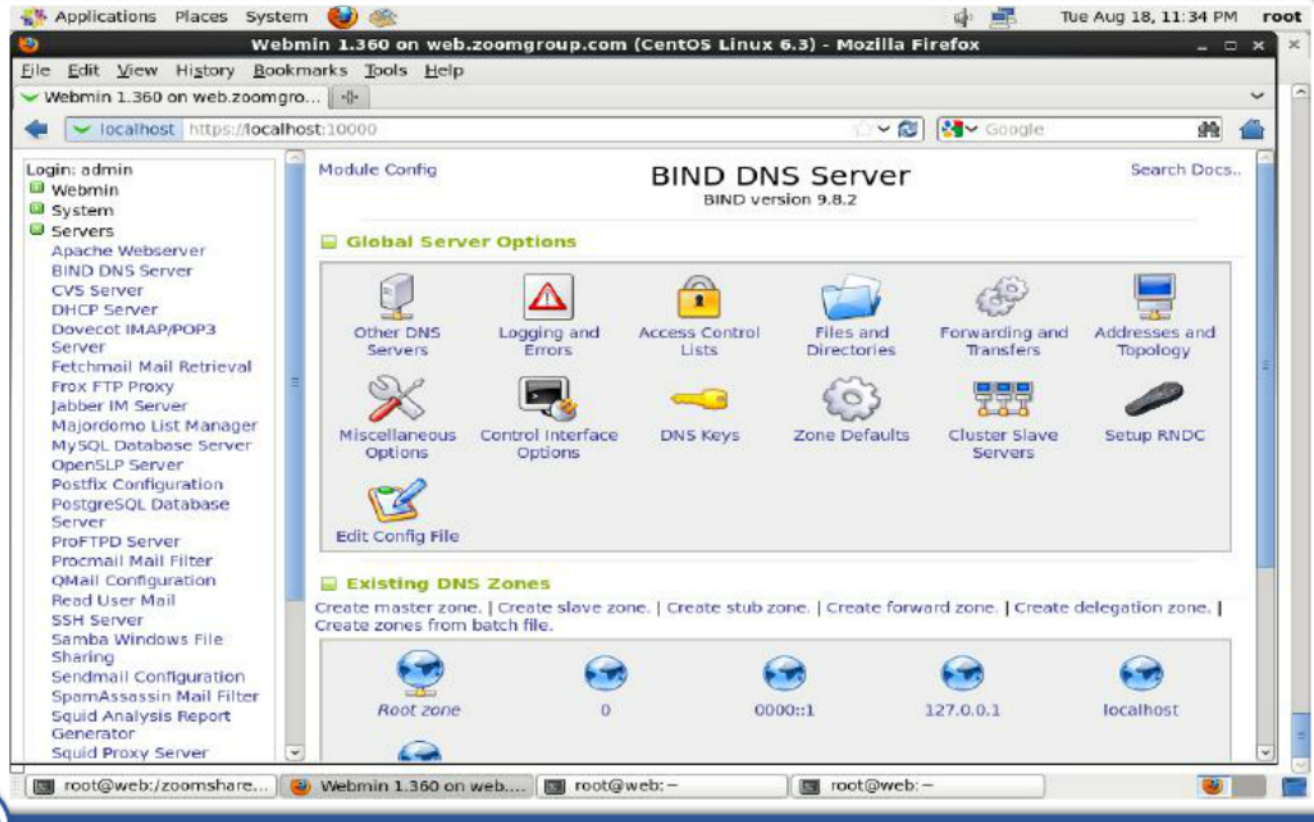
# Webmin Installation




# Webmin Installation



# Webmin Installation






# Webmin uninstalling

To uninstall Webmin

[root@server ~]# **sh /etc/webmin/uninstall.sh**

# MCSE-2012 Full Course

**MICROSOFT CERTIFIED SOLUTIONS EXPERT**

Practicals in real-time environment. Detailed curriculum with all 5 papers

**Duration: 1 Month | 4 Hrs Per Day** (starts on 15th & 30th of every month)

**Batches:** Morning: 8.30 to 10.30 • Afternoon: 2.00 to 4.00 • Evening: 7.30 to 9.30

# CCNA (v 2.0) Full Course

**CISCO CERTIFIED NETWORK ASSOCIATE**

Cisco Routers with BSNL/TELCO MUX & Live Channelised E1

**Duration: 1 Month | 4 Hrs Per Day** (starts on 15th & 30th of every month)

**Batches:** Morning: 8.30 to 10.30 • Afternoon: 2.00 to 4.00 • Evening: 7.30 to 9.30

# LINUX ADMINISTRATION

**COMPLETE RHCE LINUX**

Practicals on Live Web Administration + Integration of Windows with Linux/Unix (Samba Server)

**Duration: 2 Weeks | 4 Hrs Per Day** (starts on 15th & 30th of every month)

**Batches:** Morning: 8.00 • Afternoon: 1.30 • Evening: 7.00

# PC HARDWARE & NETWORKING

# WORKSHOP ON EMERGING TECHNOLOGIES

- Ethical Hacking, Cyber Security and Firewall
- VMware vSphere and MS Private Cloude
- Open Source: A glimpse into advance Linux
- Cisco WAN Technology & Collaboration

**Free MCSE & CCNA Exam Practice Questions**

Complete Package for Only

**Fees: ₹ 5,900/-**

+ 14% Service Tax

**Duration: 3 Months**
**4 Hrs Per Day**

**100% GUARANTEED JOB ASSISTANCE**

# EHCE | Ethical Hacking & Countermeasures Expert

Course is mapped to EHCE course from US-Council (www.us-council.com)

(Pre requisite is CCNA / MCSE / LINUX)

**Duration: 2 Weeks | 4 Hrs Per Day** (starts on 15th & 30th of every month)

**Batches:** Morning: 7.30 or Evening: 6.00

**Fees: ₹ 9,500/-**
+ 14% Service Tax

# CCNP R&S

**CISCO CERTIFIED NETWORK PROFESSIONAL**

**Duration: 1 Month | 4 Hrs Per Day** (starts on 15th of every month)

**Batches:** Morning: 7.30 • Afternoon: 2.00 • Evening: 6.00

- Labs on latest routers with IOS version 15.X

**Monitoring, Diagnostics & Troubleshooting Tools**

• PRTG • Wireshark • SolarWinds, etc.

**Exam Practice Challenge Labs**

Fees: ~~₹ 10,000/-~~

Introductory Special Offer

**Fees: ₹ 5,500/-**

+ 14% Service Tax

# CCIE R&S

**CISCO CERTIFIED INTERNETWORK EXPERT**

**Duration: 1 Month | 4 Hrs Per Day** (starts on 15th of every month)

**Batches:** Morning: 7.30 • Evening: 6.00

- Individual Rack For Every Student
- Real time scenarios by 20+ years experienced CCIE certified industry expert who has worked on critical projects worldwide.

**Written + Lab Exam Focus**

**FREE Full Scale 8 Hours Exam Lab Included**

**Unlimited Lab Access For 1 Year**

Fees: ~~₹ 25,000/-~~

Introductory Special Offer

**Fees: ₹ 9,999/-**

+ 14% Service Tax

## MICROSOFT EXCHANGE SERVER-2013

**Duration: 2 Weeks | 4 Hrs Per Day** (starts on 15th & 30th of every month)
**Batches:** (Contact the Counselors for the next available batch)

Fees: ₹ 2,500/-
+ 14% Service Tax

## MICROSOFT PRIVATE CLOUD

Microsoft Certified Solutions Expert [MCSE] Private Cloud
**Duration: 2 Weeks | 4 Hrs Per Day**
**Batches:** (Contact the Counselors for the next available batch)

Fees: 2,500/-
+ 14% Service Tax

## ADVANCED LINUX

**Duration: 2 Weeks | 4 Hrs Per Day** (starts on 15th & 30th of every month)
**Batches:** (Contact the Counselors for the next available batch)

Fees: ₹ 2,500/-
+ 14% Service Tax

## CCNA SECURITY (Pre requisite is CCNA R&S)

CISCO CERTIFIED NETWORK ASSOCIATE - SECURITY
**Duration: 2 Weeks | 4 Hrs Per Day** (starts on 15th of every month)
**Batches:** Morning: 7.30 or Evening: 6.00

Fees: ₹ 7,500/-
+ 14% Service Tax

## CCNP SECURITY (Pre requisite is CCNA Security at ZOOM)

CISCO CERTIFIED NETWORK PROFESSIONAL - SECURITY
**Duration: 2 Weeks | 4 Hrs Per Day** (starts on 30th of every month)
**Batches:** Morning: 7.30 or Evening: 6.00

Fees: ₹ 9,500/-
+ 14% Service Tax

## CCIE SECURITY (Pre requisite is CCNA & CCNP Security at ZOOM)

CISCO CERTIFIED INTERNETWORK - SECURITY
**Duration: 1 Month | 4 Hrs Per Day**
**Batches:** (Contact the Counselors for the next available batch)

Fees: ₹ 15,500/-
+ 14% Service Tax

## VMware vSphere (Pre requisite is MCSE)

**Duration: 1 Month | 4 Hrs Per Day** (starts on 15th of every month)
**Batches:** Morning: 7.30 and Evening: 7.30

Fees: ₹ 4,950/-
+ 14% Service Tax

## VMware vCloud (Pre requisite is VMware vSphere)

**Duration: 1 Week | 4 Hrs Per Day** (starts on 15th of every month)
**Batches:** Morning: 9.30 to 11.30

Fees: ₹ 2,500/-
+ 14% Service Tax

## CHECKPOINT FIREWALL

**Duration: 2 Weeks | 4 Hrs Per Day**
**Batches:** (Contact the Counselors for the next available batch)

Fees: ₹ 5,500/-
+ 14% Service Tax

**We also offer the following courses** (Contact the Counselors for the next available batch)

- **CCNA Voice** @ ₹7,500/-
- **CCNP Voice** @ ₹9,500/-
- **CCIE Collaboration** @ ₹15,500/-
- **CCNA Data Center** @ ₹7,500/-
- **CCNP Data Center** @ ₹9,500/-
- **CCIE Data Center** @ ₹15,500/-
- **IPv6 Migration** @ ₹5,500/-

## FACULTY

- All Senior Engineers of Zoom working on Live projects
- Training Engineers of British Army, CISCO, CMC, GE, BSNL, Tata Teleservices and Several Corporates etc for 18 Years.

# FREE Training

Zoom Technologies offers a number of free resources for the professional development of network engineers.

Register on our website to get access to the video recordings of live sessions on:

- **MCSE – Windows Server 2012**
- **Cisco – CCNA**
- **Cisco – CCNP** } **All Tracks (R & S, Security and Voice)**
- **Cisco – CCIE**
- **Exchange Server 2013**
- **Linux**
- **Advanced Linux** } **All Flavors**
- **Ethical Hacking and Countermeasure Expert (www.us-council.com)**

**Find us at: www.zoomgroup.com**

Like us on Facebook and get access to free online webinars as well as special offers and discounts. **https://www.facebook.com/ZoomTechnolgies**

# Online Training

Online Training at Zoom is a cost effective method of learning new networking skills from the convenience of your home or workplace.

Taking an online training course has many advantages for everyone (Freshers / Working Professionals). Zoom offers online training for the highly coveted CCNA, CCNP and CCIE courses as well as MCSE, Linux, VMware, Ethical Hacking and Firewalls, IPv6 with more courses planned for the near future. These are live instructor led courses, using Cisco WebEX. Check out our online course offerings at: **http://zoomgroup.com/online_course**

# Job Opportunities

There is a high demand for network and security professionals at all times. Apart from job opportunities in India and the Middle East, network and security administrators are also sought-after in the US and Europe.

If you do not have the right skills, then get them now! Choose the experts in network and security training, an organization which has already trained over one hundred thousand engineers.

For the latest job openings in networking and security, register and upload your resume on: **http://zoomgroup.com/careers** or visit zoom to choose job offering from several multinational companies.

## ABOUT US

**ZOOM** Technologies India Pvt. Ltd. is a pioneering leader in network and security training, having trained over a hundred thousand engineers over the last two decades.

We offer a world class learning environment, with state-of-the-art labs which are fully equipped with high-end routers, firewalls, servers and switches. All our courses are hands-on so you'll get much needed practical experience.

The difference between us and the competition can be summed up in one simple sentence. Our instructors are real-time network professionals who also teach.

Zoom has designed, developed and provided network and security solutions as well as training to all the big names in the Indian industry, for the public sector as well as corporate leaders. Some of our clients are:

TATA
BSNL
VSNL
Indian Railways
National Police Academy
Air Force Academy
IPCL- Reliance Corporation
CMC
British Army

No other training institute can boast of a customer base like this. This is the reason for the resounding success of our networking courses. If you do not have the right skills, then get them now. Come, join the experts!

## Training Centers in Hyderabad, India.


**Banjara Hills**

HDFC Bank Building, 2nd Floor,
Road # 12, Banjara Hills,
Hyderabad - 500 034
Telangana,
India.

Phone: +91 40 23394150
Email: banjara@zoomgroup.com

**Ameerpet**

# 203, 2nd Floor,
HUDA Maitrivanam, Ameerpet,
Hyderabad - 500 016
Telangana,
India.

Phone: +91 40 39185252
Email: ameerpet@zoomgroup.com

**Secunderabad**

Navketan Building,
5 Floor, # 501
Secunderabad - 500 003
Telangana,
India.

Phone: +91 40 27802461
Email: mktg@zoomgroup.com

**Dilsukhnagar**

Ist Floor, # 16-11-477/B/1&B/2,
Shlivahana Nagar, Dilsukhnagar,
Hyderabad - 500 060
Telangana,
India.

Phone: +91-40-24140011
Email: dsnr@zoomgroup.com

website: www.zoomgroup.com